FOOD INDUSTRIES

DISTRIBUTION • PROCESSING

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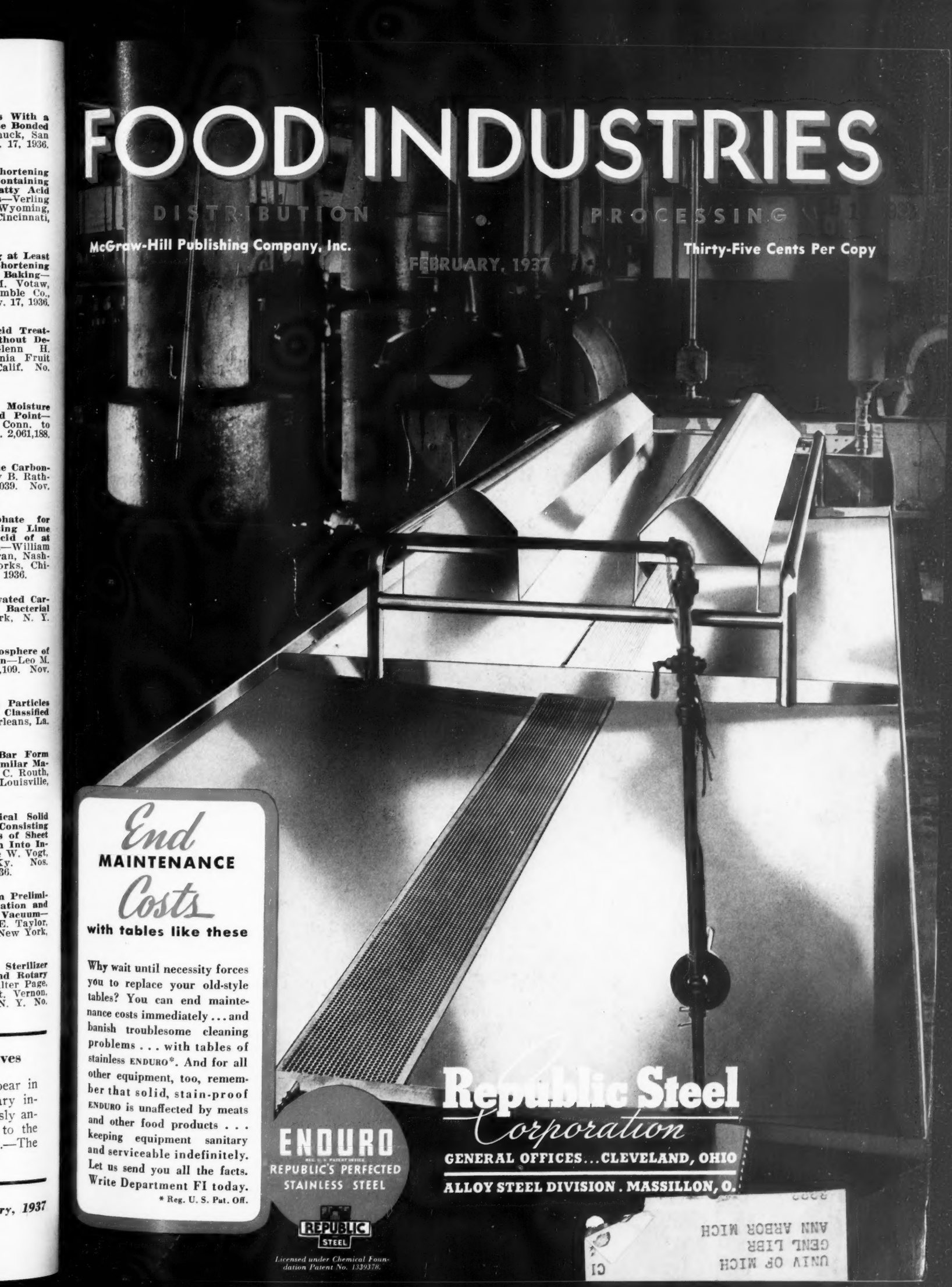

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FOOD INDUSTRIES

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For Cross Country Vision...

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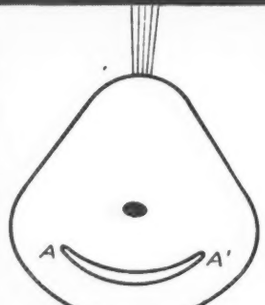
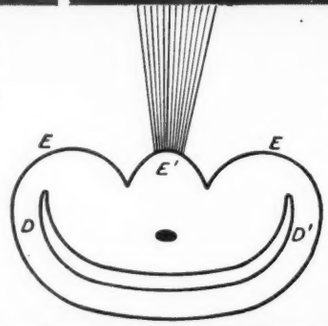
READ EASILY WITH BOTH EYES



PRESENT TYPE LENS TUBE. This is a cross section (looking down) of the usual lens tube used today. You can read this tube only by looking along one of the lines shown. The angle of vision is therefore narrow. Note small background (A-A¹) able to catch light only from directly in front. Bore reflection is present.



NEW "BINOC" TUBE WITH TRIPLE LENS. Cross section of the new Taylor "BINOC" Tubing. Note greatly increased angle of vision. Also wider background (D-D¹) catching light rays from three lenses (E-E¹-E²) and concentrating them. With this construction the reflected light is much stronger, the mercury column reading is much clearer. Bore reflection is eliminated.

FOOD INDUSTRIES

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Established 1928—McGraw-Hill Publishing Company, Inc.

Vol. 9, No. 2

Lawrence V. Burton, Editor

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FEBRUARY 1937

The Talk of the Industry

» FLAGPOLE SITTERS; tree sitters; automobile-worker sitters; corporation-executive sitters; National Labor Relations Board sitters; Federal Government sitters—such is the line of progress. From this succession one learns that the antidote for sitting down is sitting down. But what bothers us is, what is the antidote for the antidote?

» TIMES DO CHANGE; or else we are growing older. We can't be sure which it is. Yet the 1937 convention program of the National Canners Association Convention suggests a world that is different. Time was when the young blades could take the punishment a big convention inflicts and turn out fairly early next day.

Those nine-thirty morning sessions could usually gather a quorum by noon. But this year all the meetings that attracted the younger men were

held in the afternoon. Which, of course, makes it possible for the younger superintendents and field men to attend the movies or shoot a fast rubber of bridge after supper and be ready for the next afternoon's conferences as fresh as a daisy.

Only the older boys, the presidents and vice-presidents need to get up for the morning sessions. Can it be that the older generation has more endurance than the younger?

» SEE IF YOU CAN MAKE SENSE out of this:

"The daily food intake . . . can be increased 20 per cent or more by our appetite ideas. . . . When you add to this the increase in food consumption made possible by taking foods in more bulky form . . . you can see why . . . the food industry's share of the consumer's dollar can be doubled."

Thus by eating bulky foods we can all eat more.

» WHAT IS A FOOD? Put this question to any group and see what the answer is. The more cagey the individuals, the more evasive the answers you will receive. Ask them in solemn tones if milk, if bread, if meat, or vinegar or chocolate or cabbage are food. And, if not, what are they?

» THE WORLD is surely becoming food conscious to an amazing degree. Here is another example of the food *motif* in ladies' dress design. Wallace of London now puts out a Wool Spaghetti Dress.

Let's see, the list now includes

Air Conditioned Pyjamas
Vitamin C Dresses
Wool Spaghetti Dresses

» GOLF COURSE CHEMISTRY, a most peculiar problem sometimes worries the souls of Directors of Research in big companies. Only those who are associated with outfits that have big buying power are thus afflicted.

To describe the new affliction as "Golf Course Chemistry" is to em-

ploy an euphemism—i.e., to use a nice sounding term where a short, nasty Anglo-Saxon word would be much more descriptive, to say nothing of accurate. And, by the foregoing, we do not infer that all Directors of Research avoid the naughty words. In fact, it appears that production men and editors can enlarge their vocabularies by hanging around research laboratories.

Golf Course Chemistry is the variety that is spilled into the ears of the Captains of Industry while the self-appointed tutor allows a member of the Board of Directors of the big company to beat him about five up, at a dollar a hole. For such is roughly the fair going-price for one lesson in Golf Course Chemistry. Any good tutor can put the Research Director in bad with the whole

Board of Directors after an afternoon on the links and four Old Fashions, followed by a big steak and onions.

And then all that the Research Director has to do is to unsell the Board of Directors and convince them that he was right in the first place. It only takes about two weeks to undo a five-hour lesson in Golf Course Chemistry, but in the meantime most of the real research work for which the Research Director gets paid, will be seriously delayed.

In actual practice it works out this way: A High Pressure Salesman with a bright idea to sell approaches the president of the company with a scientific scheme. Oh, very, very scientific. Sometimes the first contact is a vice president, or a production manager. Anyway the scheme sounds so HOT that the executive gets excited, sends for the Research Director, and instructs him to look into it very carefully. The President, of course, has forgotten all the chemistry he ever knew and couldn't tell the difference between a pH and a pycnometer.

Then, after the High Pressure Salesman goes over his proposal with the head of the research department, he may find that it is not suited to the plant or the process, or maybe the scheme is a phony. Or, more likely, the Research Director had tried it several years back, knew all about it and why it wouldn't work. He turns it down.

So the next move on the part of the High Pressure Salesman is to cultivate the various members of the Board of Directors and tutor each one in a concentrated course in Golf Course Chemistry. And, sad to relate, it is usually easier to sell a gold brick to a Captain of Industry out on the golf course than it is for the Director of Research to convince his own President of the merit of a development job that has been in the works for a couple of years, at the very least.

The remedy? It's not easy. Our best guess is that Board Members who have forgotten their science had better confine their adult education to more formal occasions.

That New Orleans Ad

PITY THE PLIGHT OF A & P after its irresponsible New Orleans office had published without authorization the now famous ad in which prices of A & P private brands were shown to average 29 per cent lower than those of fifteen nationally advertised brands. It must be terrible to be afflicted with irresponsible people in New Orleans. Mardi Gras is still too far ahead to blame it on the confetti or the parades.

A & P is doing its utmost to right the wrong impression that many unfeeling food manufacturers gained from the pranks of their bad boys. When Mr. John Hartford found that food manufacturers were willfully misunderstanding the price comparisons, which neither he nor Mr. F. W. Wheeler knew anything about, his distress was very evident.

Later there were hot rumors flying around the country: that some food manufacturers thought this was a real challenge and were requesting the Federal Trade Commission to investigate it as an unfair act; that others were taking steps to induce other chain stores to publish prices comparing the price of the advertised brand in their chain with the prices in A & P stores; that some especially vindictive manufacturer was getting ready to publish his invoice prices to A & P to tell the cockeyed world that A & P was kidding the public by hiking the retail price to show an artificial saving; and that another manufacturer vowed he would show up the unconditional guarantee that the quality of A & P manufactured goods was equal to that of his own brand by publishing comparisons.

But when other big manufacturers were reported to be ready to withdraw all goods from A & P and were going to refuse henceforth to do any more business with that chain, it is surmised that Mr. Hartford was then really sorely tried. A food manufacturers' sit-down strike would leave a lot of empty shelves and a lot

Hors d'Oeuvres

• The average housewife walks some five miles daily in the pursuit of her household duties. Probably at least two miles is in pursuit of a can opener.

• *Russia will finance her 1937 defense budget of some 20 billion rubles from the profits of her food industries. Any enemy who dares take up arms against her literally will be eaten up.*

• The flying diner is becoming more important as a food consumer. For example, 370,000 meals will be served this year in the new super de luxe Skylounge service inaugurated by United Air Lines. Bakers must bake their biscuits light and ice cream manufacturers use a high overrun to get this trade.

• *An archaeologist recently discovered what he reported to be a 2,000-year-old berry and nut cake on the site of a pre-Revolutionary Indian village near Avon, N. Y. What he found was some nuts and berries in a copper kettle. Are we glad we don't buy cakes from archaeologists!*

• Swift & Co. will erect a soybean extraction mill which will take 650 carloads of the beans annually. Would it be too much to hope that this is the beginning of a move on the part of the packers to use up all the soy beans so farmers won't feed them to their hogs and produce soft, oily pork?

• *Natives of Australia eat caterpillars, cicadas and other insects, and pupa cases are a favorite dish. But the Bushmen of South Africa are more particular. They don't go for fuzzy caterpillars. They prefer the smooth variety.*

• The "very rich" listen to the radio, a study of 250 families of Boston's 400 reveals. And they like the same programs enjoyed by the masses. Aren't you surprised at their good taste.

• *Autos are cheaper per pound than beefsteak. But you can't eat an auto. Nor for that matter can you eat some beefsteak. But you can drive an auto. Yes, and a cowboy can drive a steer.—Who started this argument, anyway?*

• The latest thing in drug stores has the soda fountain partitioned off from the rest of the store, that is, from the place where they sell books, toys, neckties, lamps, corn poppers and alarm clocks.

• *The newest bakery product is a deep-fried "cake treat," shaped like a ball and probably made from the hole of the doughnut. It is called, dear reader, "Puffie Wuffies." If this kind of baby talk becomes popular in the food field, we'll be eating cakie-wakies, porky-workies, cookie-ookies, hashy-washy, soopy-oopy and —stop! We're driving us nutsy-wutsy.*

of explaining why A & P were "fresh-out" of certain brands.

Yes, indeed, it must be an affliction to have irresponsible employees in New Orleans. And New Orleans is such an attractive place, too. Happily everything is all right now, and everybody feels better.

What Lewis Wants

PROBABLY NO ONE QUESTION has been asked of us more frequently in the past month than "What does John L. Lewis want?"

The answer, it seems to us, is that he wants power. Although he is reputed to have said he wants to be the next President of the United States, no one can tell when or where he said it. However, his present C.I.O. activities conceivably fit into such a plan. His present strategy is to get more power. If the C.I.O. union wins the strike in the auto industry, it will mean the ultimate domination of all large industry by Mr. Lewis, for his plan is as despotic as any the worst business tyrant ever devised.

If C.I.O. wins, the industry will be unionized vertically, nobody can get a job unless he belongs to a C.I.O. union, and the check-off system of collecting dues—so effectively used in coal miners' unions—from the employer will be installed. That will give Mr. Lewis plenty of money and power to take the next step in controlling industry.

Opposed to him are William Green and the A. F. of L., which leaves Mr. Roosevelt in as uncomfortable a position as he has ever seen.

Effect of The Strike on The Food Industries

THE FINANCIAL INTEREST which the food industries have in the General Motors strike is enormous, and likewise its effect is peculiar. With 135,000 people out of work, not only is their own purchasing power curtailed, but also there are 3.3 other persons whose livelihoods are jeopardized. These people live on the wages of the industrial worker. Then, when their livelihoods are cut off, each one's loss affects still more people though perhaps to a lesser degree.

Thus 135,000 people out of work means about 580,000 people without income. And all these people normally consume 1,580 tons of food a day which is equivalent to 88 carloads, worth roughly $175,000, f.o.b. factory. In a week the normal food purchases of those most intimately concerned with the strike amount to $1,225,000.

The government will not allow them to starve, but who will pay the cost of their food? It appears to be inevitable that the recoil from this wage loss will be felt by the entire industry. Volume of sales will not be changed materially but prices are bound to be adversely affected.

World Wide Photo

REVEALS DEFECTS INSIDE ORANGES

X-rays can now be used to inspect the pulp in oranges. The fruit passes through a machine at the rate of 22,500 an hour, and defects show up in a fluoroscope. To reject bad fruit, the inspector merely throws a lever; good oranges continue through to be packed for shipment. The machine shown is being tested by California Fruit Growers' Exchange at Lamanda, Calif. Evidently it's much easier to spot a "defect" in an orange than in the heart by X-ray, the latter being barely visible to experts.

To Increase Bread Consumption

BAKERS OF BREAD will be tremendously interested in the struggles of Germany to function on a self-contained basis. In an effort to avoid importing food stuffs the Germans are forced to go on short rations.

Their method of reducing the consumption of bread carries a lesson for the baking industry of the United States. No German baker is allowed to sell bread that is less than 24 hours old, according to word received in the United States, on the theory that people do not eat as much stale bread as they do of fresh.

This rule indicates that the surest way to increase consumption of bread is to reduce the time between the oven and the American dinner table. Greater success lies in that direction than in education.

Per Capita Food Consumption

SOMEBODY down in Washington put out some figures last Fall on per capita food consumption. Inasmuch as these figures have come from *Consumers' Guide,* an AAA publication, they should be regarded critically, for AAA has not yet earned a reputation for freedom from bias.

The *Consumers' Guide* report stated that in 1925-1929 the average per capita food consumption was 1,474 lb.; in 1930-1933 it was 1,454 lb.

The FOOD INDUSTRIES estimate, published on page 2, January, 1932, showed 2,150 lb. Our findings were based largely on reports from the U. S. Department of Commerce, but included estimates of the amount of unmanufactured foods produced on farms and eaten there.

Where the difference of 700 lb. per person between our figure and the *Consumers' Guide* figure originates we do not know. But somebody seems to be either 30 per cent or 50 per cent in error. It all depends on who you are backing.

Good Employee Relationships *Rest on* THREE BASIC PRINCIPLES

R. R. DEUPREE *Nicholas Bors*

Based on a recent address before AGMA

By R. R. DEUPREE
President, The Proctor & Gamble Co.
Cincinnati, Ohio

AFTER 100 YEARS IN BUSINESS, Procter & Gamble can summarize its experience in good industrial relations by three basic principles. We believe these principles are the indispensible basis for any program of successful employee relations. First, there should be a constant consideration of the welfare of the employee. The ideal fruition of this principle is a steady job, all year round, year after year.

Second, management should make it possible that every employee should become a capitalist, in fact—not merely in theory or political creed. To make this a fact, the employee should be helped to save money, and should be helped to keep it. The latter is very important.

If these two basic principles are properly carried into effect, then the third principle becomes easy to apply. This is that every employee should be able to look forward to a small old age pension from his company. And, if employees are properly helped and guided in becoming capitalists, with homes that are paid for and a few income-producing investments, the need for an old age pension becomes less and less important. In cases where the second principle has been well carried out, the need of the old age pension becomes of smaller moment because the employee is practically financially independent when he arrives at the retirement age. In such cases, the old age pension tends to become more of a symbol of a reward for a life of good service than an obligation on the treasury of the company. The greater the degree of financial independence, the less the need for sizable retirement payment.

Though these principles are in successful operation in all Procter & Gamble plants, their development and installation has been the outcome of a long and careful process of trial and error dating from 1854, when the first systematic step toward better employee relations began. Yet, 29 years later when W. C. Procter instituted a number of important steps toward the goal of his ideal in 1883, he was considered a bit radical. Nevertheless his plans have been greatly enlarged in the ensuing years and the company still prospers.

In our opinion, good employee relations are an asset so large that it can be truthfully said that good employee relations cost you little. In all our hundred years of experience we have had no strikes except two very minor incidents. One was a two-day incident in which the girls in one department made a protest over an existing situation. It was a matter that would have been automatically and instantly corrected had we become aware of it by some other means. The other case occurred during the World War when we advised the employees in one of our plants to walk out while there was strife in adjoining plants. Our action was based on the desire to prevent any of our own folks being mistaken for strike breakers at other plants with possible unpleasant consequences.

Labor trouble is very costly, not only to the employee but to the employer. Although we have had no experience with labor trouble, one cannot help but learn about it from those who have been through it. The cost of a strike is probably a much larger sum than anyone can accurately estimate, and after the issue is technically settled there persists for a long time, perhaps years, a number of secondary reactions, the real cost of which can only be guessed.

Hence we feel that what success we have enjoyed in good employee relations has been gained without tremendous cost to the company as measured in dollars. On the contrary, the credits at times outweigh the debits.

Although, in the light of our ex-

perience, good industrial relations are not burdensome, they do demand a great deal from the management of the company in the way of effort, forethought and aptitude for the task. Their success springs from a genuine desire to be helpful to our fellow man and only those who have proper qualifications seem to be able to bring them easily into effect. Those who bring the greatest ability to bear on the development of good employee relations are socially-minded, economically-minded, politically-minded and religious. And of these four attributes, a deep religious conviction of the worthwhileness of the effort is the most important. Without it, the other qualifications lose much of their motivation and do not carry the conviction of sincerity. For employees must realize the sincerity of the employer or his efforts will fail to win the cooperation on their part that is so necessary to put a sound plan into effect. Good employee relations are a development from both sides. They are not something which can be imposed by an edict from the Board of Directors.

Profit-sharing alone will not solve the problem. It was tried by Procter & Gamble as long ago as 1887 when it failed for the reason that it was paid in cash and the employees spent their extra money as fast as they got it. Thus they were unable to bring themselves nearer to the goal of independence. The average man needs help to save his money. And cash bonuses likewise are not the solution, though every person doubtless enjoys receiving them.

Out of our experience in the school of trial and error, we have evolved the plan of crediting the employee with 10 per cent of his wage while the employee contributes 5 per cent of his wage. After six years the employee stops giving his 5 per cent but the company continues to credit his account with 10 per cent of the wage which he earns. Thus at the end of the first six years, the employee now owns stock in the company which has a value equivalent to one year's wages. The average wealth of the employee arising from this part of our plan is about $2,000.

Once a year we have an employees' meeting called Dividend Day, when the dividends on employees' stock are paid. The wives are invited to attend these meetings and we talk to them all. The employee's wife is an important ally and an integral part of the industrial relations set-up. And frequently she is the one who draws her husband back to sanity when he may have been unduly influenced by wild talk.

Other steps which have been put into effect are the half-holiday on Saturday, sick benefits, the employee conference plan. In 1923 we began to guarantee the employee a minimum of 48 weeks of employment per year after one year or more of service. This move we considered to be our greatest foreward step, for it is the very root and foundation of good employee relationship.

Our experience does not enable us to advise others on how our plan would work in a seasonal business for our operations are continuous the year round. Nevertheless we feel that socially-minded industries will ultimately cooperate in order to bring about a condition of uniformly distributed buying and thus eliminate as far as possible, consistent with the agricultural raw material production problem, the seasonal peaks and valleys which operate against continuous employment.

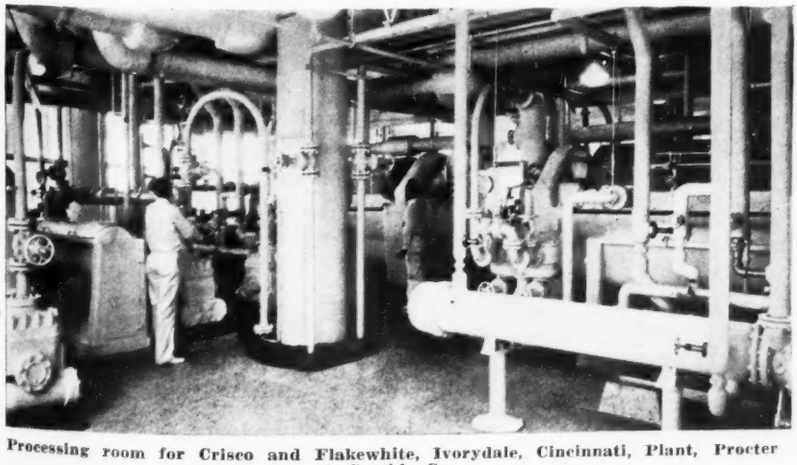
Our next move has been the one week vacation with pay every year. Every summer we shut down our plant for one week for repairs. Formerly this one week lay-off was dreaded, but now it is anticipated.

A foreman, under our plan, does not hire his own help, nor can he fire them. If the service department supplies him with a person he does not like, he is not obliged to accept that person and, if he wants to remove a person from his department, the employee is returned to the service department but kept on the company's payroll. The foreman who loses a man receives a black mark on his record. If a man finds it impossible to work under a foreman, the charge, so to speak, is upon the foreman, not upon the employee. The basis of this feature of our plan is that we cannot build an organization by losing men. The employee must have confidence in his employer and must be taught to know that if the company is wrong in any employee relationship, it will get right.

GOOD EMPLOYEE RELATIONSHIPS are associated intimately with good quality of product, On several occasions we have purchased other companies that had failed in business, yet investigation showed that at the same time Procter & Gamble were paying wages 25 per cent higher than the company that had failed. Manufacturing costs where good relationships prevail were less than the costs where they did not prevail.

Management must supply "the fuller life." It cannot come from law. High wages are not the only answer to the problem of good employee relations. When NRA was enacted it was only a partial attempt to legislate what Procter & Gamble had been doing for years.

Legislation will prevent rather than procure good employee relations. Legislation cannot possibly develop in the employer all of the attributes that are the indispensible foundation for good employee relations. Without the requisite sincere social-mindedness, economic understanding, political insight and religious conviction that must underlie such a program, legislation merely places a premium upon evasion of the provisions of the law, and without the true spirit of an earnest desire to be helpful to our fellow man, any system of industrial relations becomes soulless and a sham.



Processing room for Crisco and Flakewhite, Ivorydale, Cincinnati, Plant, Procter & Gamble Co.

Something New In Conveyors

Fig. 1—Section through a 2 in. Johns conveyor tube, showing the ribs, the double tongue and groove joint, and the reinforcing chain.

A Pipeline that *Moves*

SOLID MATERIALS in powdered, crushed or broken form are handled with freedom from dust or spilling in a new conveyor made by the Johns Conveyor Corporation, 605 Broad St., Newark, N. J. The device consists essentially of a rubber tube formed of two separate halves. The material being conveyed is held within the closed halves of the tube which, in the form of an endless belt, is moved over pulleys.

For such operations as the handling of grain, starch, or other inflammable products, this new method offers freedom from the hazard of dust explosions or fires. With other materials, where these hazards are not met, the flexibility, economy, and cleanliness of operation of this conveyor indicate a wide field of usefulness. Another advantage lies in the ease with which it can be kept clean and sanitary.

Food materials suitable for handling in the Johns conveyor include grains, flours, meals, breakfast foods, starch, cocoa beans, cocoa, oil seeds, small fruits and vegetables, dried vegetables, dried fruits, nuts, coffee, tea, sugar, salt, spices, among others.

Fatty or oily materials will require the use of some other material than rubber in the tube. This application is now being worked out, and one installation has been in operation for about three months on a material with a 3 per cent oil content. Synthetic materials of a rubber-like nature may be used for this purpose. These synthetic materials, unlike rubber, resist the action of oils or greases. Also, they have the other qualities, such as flexibility and resistance to wear and corrosion, which make rubber useful for constructing these tubes.

Liquid materials may also be handled in the Johns conveyor when for some reason the use of a pump is not desirable. This has been carried out successfully in the laboratory, but not so far on a plant scale.

Additional uses may be found for the new conveyor, such as in the handling of lithographed cans to avoid marring. However, it is probable that the important applications in the food field will be found in the handling of solids in powdered form or in small pieces.

In Fig. 1 is seen a small length cut from a 2-in. internal diameter tube. In this picture are shown the double tongue and groove joints, where the two halves of the tube join. Note the four longitudinal ribs or projections on the outer surface of the tube. Note, also, the reinforcing, consisting of a steel chain imbedded in the full ribs of each half of the tube.

One other feature of the tube design should be noted. The two halves of the tube are not alike in that the bottom or loading half contains regularly spaced partitions, as can be seen in Figs. 1 and 2. These partitions are of rubber and are formed in the molding of the tube half, so that the whole thing is in one piece. When the two halves of the tube are held firmly together, these partitions are forced against the cover half of the tube, forming a series of tight compartments. Contact of the upper half of the circumference of the partition with the upper half of the tube

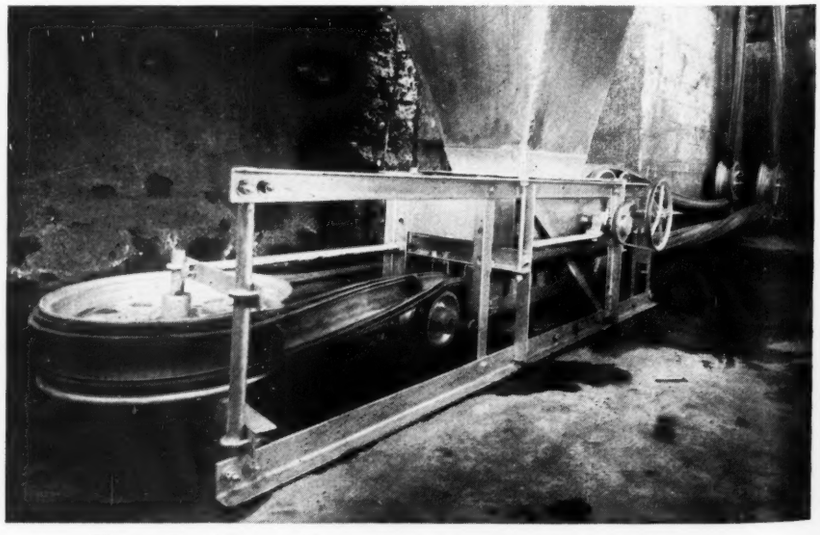


Fig. 2—Loading coal into a Johns conveyor from a track hopper.

is close enough so that liquids can be elevated in the compartments without danger of their leaking backward.

Installation and operation of the conveyor are evident from Figs. 2, 3 and 4. In Fig. 2 is shown the loading arrangements of an installation handling coal from a track hopper to a discharge above the coal bunker about 80 ft. above the track. In the upper right hand corner of Fig. 2 the loaded tube is shown going up on the right, while the empty tube is coming down in the left.

This empty tube runs over an idler pulley, and its direction is thus changed from vertical to horizontal. Note how the idler pulley is grooved so that it positively engages the rib on the tube.

Beneath this idler pulley can be seen a small guide pulley. As the tube leaves this guide pulley the two halves separate. The upper half, which forms the cover when the two halves are joined, can be seen as it passes over guide pulleys on the far side of the loading hopper.

The lower, or loading part of the conveyor tube, is brought along behind the hopper. It then passes first over the idler pulley down at the extreme left of Fig. 2, and then over a guide pulley which gives it a quarter turn into the correct position for loading.

After leaving this guide pulley, the loading half of the conveyor passes directly into the loading frame, under the hopper. As shown in Fig. 2, this frame carries metal guide plates, which ride directly on the inner flange portions of the half tube. These plates prevent the material that is being handled from spilling. During loading the tube half rests in the semi-circular cradle that can be seen in Fig. 2.

Material flows from the hopper into the lower half of the tube, an agitator or vibrator being used to aid the flow where needed. As the tube half leaves the loading frame, the upper half of the tube is forced down on it as shown in Fig 3. The two halves then pass together through a pair of guide rolls, which serve to complete the closing of the double tongue and groove joint.

It will be seen from Figs. 2 and 3 that the tube, between idler pulleys, is twisted. This twist is put in when the tube is originally threaded through the pulleys. It serves to keep the tube under tension, and thus tightly closed, as it moves along.

Unloading is illustrated in Fig. 4. At the right of this picture is seen the empty tube moving downward. The upward moving filled tube is behind it. This filled tube is the lower of the two horizontal tubes. It passes through the guide pulleys near the center, where the two halves are split open and the load is discharged into the hopper. The two halves then pass separately around the drive pulleys and are brought together between guide pulleys at the center. Note the simple arrangement of the idler pulley suspension and take-up shown at the right of the photograph.

Many other methods of loading and unloading are possible. The method used can be designed to suit the material handled and the plant layout. Intermediate pick-ups and discharges can be arranged where desired, as when the conveyor serves several bins or silos. Also, it is possible to cleanse and sterilize the belt between discharge and loading joints, without stopping operations. The example shown is that ordinarily used for a straight elevating job.

Johns conveyors will be available in sizes from 2 to 12 in. Theoretical capacities, at speeds from 100 to 500 ft. per minute and with materials of varying weight, are given in the table.

The first applications of this conveyor were made in Canada. There, some of the conveyors have been in service for over three years, and their economy of power, dependability and flexibility have been demonstrated. One of these applications is in the Wagstaffe plant of Canadian Canners, Lt., where raw sugar is handled. In the United States, where the first installation was made less than six months ago, there are no food plants using the conveyor as yet. Materials now being handled satisfactorily in this country include coal, chemicals and soap powder.

TABLE OF CAPACITIES

	Materials weighing 100 lb. per cu.ft. at conveyor speeds in feet per min.					Materials weighing 50 lb. per cu.ft. at conveyor speeds in feet per min.				
	100	200	300	400	500	100	200	300	400	500—
2 in. (Cap. in Tons per Hr.)	6	12	18	24	30	3	6	9	12	15
3 in. (Cap. in Tons per Hr.)	13	26	39	52	65	6.5	13	19.5	26	32.5
4 in. (Cap. in Tons per Hr.)	24	48	72	96	120	12	24	36	48	60
6 in. (Cap. in Tons per Hr.)	54	108	162	216	270	27	54	81	108	135
8 in. (Cap. in Tons per Hr.)	96	192	288	384	480	48	96	144	192	240
12 in. (Cap. in Tons per Hr.)	216	432	648	864	1,080	108	216	324	432	540

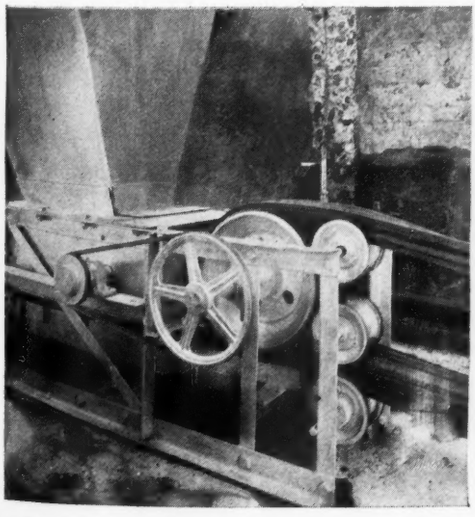


Fig. 3—Johns conveyor loading arrangements.

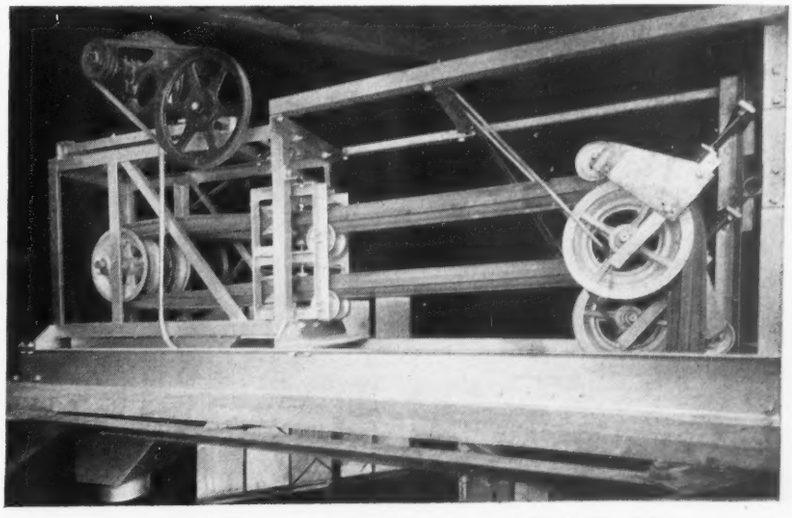


Fig. 4—Unloading arrangements of the conveyor shown in Fig. 2.

I am a Retailer

By CARLTON S. SMITH

This island display jumped sales of the same merchandise up more than 50 per cent above shelf sales; but it is not profitable, it clogs traffic in rush hours and drives customers to other stores.

Many women, who refuse to buy in stores congested with island and floor displays, take their trade to stores like this, where uncluttered floor space allows customers ample room in which to move about.

My store is your vending machine. Carried in regular stock are only those products Mrs. Consumer demands. She is your customer — not the retailer.

"THANKS A LOT FOR YOUR ORDER. May I put up a couple of signs for you?" This request or a variation of it is familiar to every grocer. This is the usual way manufacturers' representatives end an interview.

Millions of manufacturers' advertising dollars are spent for advertising and display material to be used as dealer helps by the retail grocer and, unfortunately, the usefulness of this material depends on the sales representative who competes with other salesmen selling the display of his products as well as the product itself.

Many grocers take the path of least resistance and allow sales representatives to set up almost any display material in their tores. But after the salesman leaves down come the displays and out the back door they go. Occasionally, salesmen sell their display material into the retail store and make it stick. Then, too, some displays are really worthy of a place in a retail store. In these cases the displays stay up and both the grocer and the manufacturer benefit from them. In most cases, however, displays are not used and the money invested in them is wasted.

Retailers have learned that their display windows are their contact with the customer. They want in these windows the materials which will attract the greatest number of customers of the kind they wish to serve. They have learned that, when they give a window to the display of a single manufacturer's product, although they may increase the sale of that manufacturer's product, they will not bring as many desirable customers into their stores as they would if their windows displayed an attractive selection of merchandise. Those retailers who use manufacturer displays in their windows and use them regularly are those who are too lazy to do their own window decorating. They are the retailers of least value to the manufacturer from the point of sales volume.

The retailer today is more than a grocery clerk. He knows something of consumer reactions. If the retailer's store is small there is no room on the floor for displays. If his store is large, he wants all available floor space uncluttered so that his customers may move freely about. This is not the retailer's stubborn viewpoint. This is consumer demand. It is an insistent demand in better neighborhoods, at least a strong request in poor districts. The retailer is not inhospitable to the floor display. He welcomes it when it fits his floor plan, when it does not hinder free flowing traffic. The one type of floor display that is most accepted and longest retained in use by the retail grocer is the display stand which serves as a convenience to both retailer and consumer, especially where the display stand carries a family group or variety of related packages. The Kraft cheese display stand designed either for counter or floor is such a stand; it keeps related merchandise assembled and is a convenience to retailer and customer alike. It is popular with the retailer because it increases the turnover.

Counter displays are much more welcome than floor displays. Limited

indeed is the floor space the merchant can find for floor displays. Limited, therefore, must be the number of displays. But after the merchant has provided ample counter space for each of his clerks, on which to sack the purchases of customers, the remaining counter space he gladly fills with merchandise displays.

The successful modern retailer has taken a page from the chain store book of experience. He has learned the value of displays, and also he has learned how to build them attractively himself. The salesman's display of his company's products is welcome if that display proves to be better than the retailer himself can prepare. It is welcome also when it conserves the time and expense of the retailer.

Little does the manufacturer realize the mortality of his displays, especially those of cardboard and light or flimsy material. Within a few days to a week, products packaged in containers of this type find their place in stock on the shelves. Displays should be changed frequently and at best the life is short.

Much credit is due the manufacturer who has designed a display container which becomes a permanent fixture in retail stores. Two general types of display do remain permanent in many stores—permanent because of the nature of the product and the type of container. These displays provide for packages so small they would otherwise be lost on the retailer's shelves, or they display in paper or glassine bags products certain to be crushed or destroyed on shelves or in boxes. The bag-racks display garlic, potato chips, nuts and popcorn, while the containers for very small packages display such products as tea, boullion cubes, small rolls of cheese, rolls of candy drops and cake decorating confections. Many retailers have found that these displays move goods which without the container they could not afford to stock, items valuable because the sale of these products represents plus business. This is easily proved, for in many stores where hang-up displays of boullion cubes and like products are displayed near the cash register, such products are included in the customer's purchase *after* the main order is rung up.

Apparently some manufacturers lack foresight in planning displays for retail outlets, or else they buy them from gadget manufacturers without determining their usefulness to the retailer. Both floor and counter displays have been sent out by manufacturers designed to contain a definite number of packages of his merchandise. Far too often these packages fit so tightly in the container that the customer cannot remove them easily and sales are lost. Mrs. Consumer is no athlete—she takes no hurdles—she buys no products that add to her sales resistance.

Ingenious contraptions for display purposes are sent out to the retailer without proper directions and instructions for erecting. Properly erected, these are no doubt very successful in producing sales. But the retailer has not the ingenuity nor the time for these crossword puzzles.

The price-tag is a very important part of any display—so important that it merits discussion. Simple tags that can be readily marked with paint or chalk, just large enough in size to be easily read, are better than elaborate and artistic enamel displays which, though they provide space for price-markings, do not provide the retailer with a kind of chalk or paint which will register on the enamel. Mrs. Consumer, plain and simple in her business life, puts a price-tag on every thought she thinks. Why not let her dictate the rules of the game? Give her simple price-tags, not ornate ones. If the manufacturer or his display designer would spend a few weeks each year in retail stores, the retailer would have more merchandisable displays for the products.

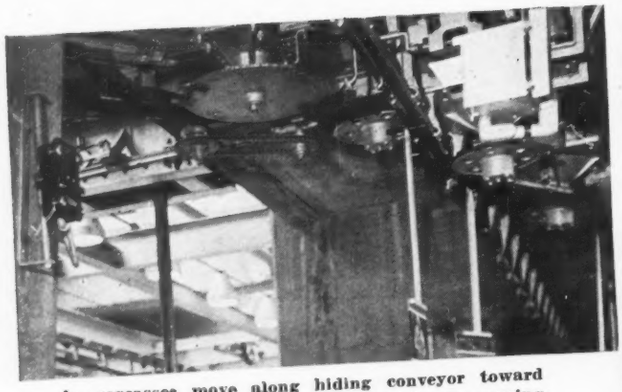
POSTERS AND SIGNS are a hangover from the old corner grocery store and are no doubt still used by rural stores and by slovenly merchants in poor districts. The successful independent grocers, serving middle class and better neighborhoods, have learned that simple display racks which do not detract from the package, or displays without racks, attract far more attention and ring up larger sales than posters and signs. The modern package is an eye-catcher, and as a display out rates the sign and poster in producing sales. Banners and window signs are not unwelcome, but only a small portion of the offerings can be accepted and successfully used.

Today and tomorrow the retail grocery dealer is interested in long profit items. He is naturally most interested in displays that turn over the long profits. Therefore, the most welcome displays which the salesmen can prepare or erect in the retailer's store are the displays which include a number of long profit items accompanying the manufacturer's own product. A display that is popular with retail grocers is one which groups together a number of products sold as a group at a combination price. This group contains a popular leader among long profit items.

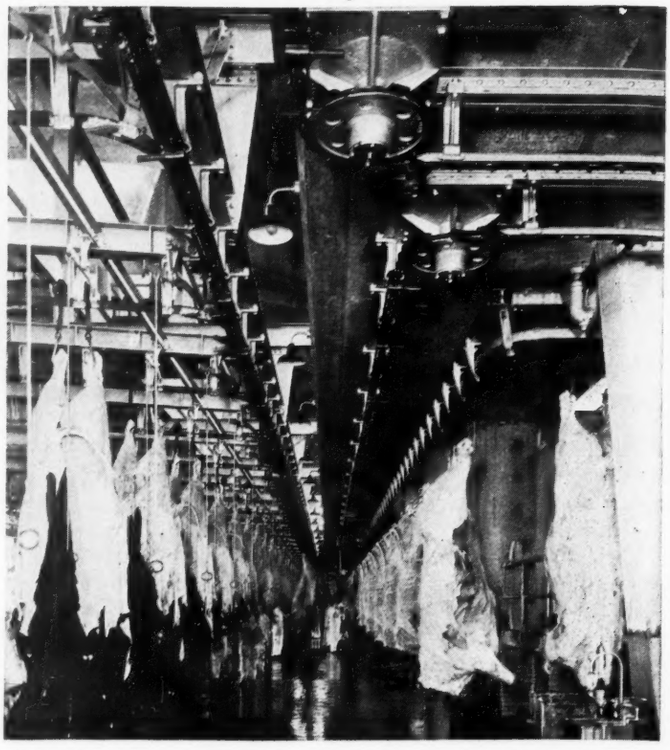
Today's retail store merchant wants displays and dealer helps which the manufacturer himself, attempting to get the maximum turnover of long profit items, would want were he a retailer. Retailers must listen to Mrs. Consumer. She makes the rules—she dictates the policies—she is the manufacturer's real customer—not the retailer. Satisfy her and the retailer is satisfied. That brings profits to all.

This rack displays packages of related merchandise in which there is a good turnover. It is a convenience to buyer and seller.

Hang-up and similar displays of small packages, surrounding the cash register, provide plus sales.



As carcasses move along hiding conveyor toward viscera tables, they interrupt a light beam, causing a photo-electric cell to operate a switch. The carcasses are switched alternately to one table then the other.



Overhead conveyors carry beef carcasses through various processing operations in new Armour beef house. Carcasses hang from trolleys which move on monorails, power-driven chains pushing the trolleys along. This shows hiding conveyor.

How Armour Handles 2,200 BEEF

The most up-to-date equipment was not enough. New methods had to be worked out for the world's largest beef house

By F. A. LINDBERG
Chief Engineer, Armour & Co., Chicago, Ill.

EFFICIENT USE of standard equipment had to be supplemented by new methods of handling materials in the new Armour beef house. The high capacity of 2,200 cattle a day introduced problems not before encountered.

As those familiar with beef killing operations know, materials handling starts at the knocking pen. There the stunned animal is rolled out onto the floor and hoisted to an overhead rail. Pushed along this rail, the trolley carrying the animal is engaged by a power-driven chain to be moved along the bleeding rail. The bleeding conveyor in the Armour beef house operates at a speed of 15 ft. a minute, and the chain has fingers, or lugs, spaced at intervals of 3 ft. to engage the trolleys.

Leaving the bleeding rail, the carcasses move onto an overhead conveyor called the heading chain, where the speed is stepped up to 45 ft. a minute and where the finger spacing is 9 ft. At one point along this conveyor, the heads are removed and placed on a separate chain conveyor to be examined by government inspectors and processed according to requirements. This separate head-inspection chain has a total length of 470 ft., with hooks on 2-ft. centers. It has a holding capacity of 235 heads, and is arranged in loops to take up a minimum of floor space. The heads are thus held until the corresponding carcasses have passed through the dressing operations and final inspection. So the carcass and head of any "rejected" animal can be brought together conveniently.

After the head is removed, the carcass is conveyed to a storage rail near the skinning beds. From this rail, it is switched onto a short rail running at right angles to the storage conveyor, there being one of these rails over each of the 22 skinning beds. Moving by gravity down the rail, the trolley comes to rest on a hook attached to a hoist which lowers the carcass to the floor. When the floor operations are completed, trolleys are hooked under the tendons in each rear shank of the carcass, and these trolleys are hung on the ends of a metal spreader. This spreader is attached to a hoist which raises the carcass to "half-hoist" position for certain operations not done on the floor. These completed, the carcass is raised completely off the floor and

the trolleys are automatically transferred from the spreader to an overhead rail.

Then the carcass moves by gravity from this rail onto an overhead conveyor called the hiding conveyor, running at right angles to the former. There the trolleys engage with a moving chain which carries the carcass through further operations and then to the eviscerating tables. Beyond the tables, the carcass travels on an overhead conveyor through the splitting and shrouding operations, the two halves going to the cooler.

But in the Armour beef house the materials handling operations on the killing floor were complicated by the fact that the government set a maximum speed past one traveling viscera inspection table of 120 cattle per hour. This presented a problem never before encountered on a beef killing floor. If the traveling type of table was to be used, two would have to be installed. And from a cost keeping standpoint, with killing done in lots, it was necessary to install some device to switch alternate carcasses to each table, and then reassemble the carcasses again in the same order on one conveyor after evisceration.

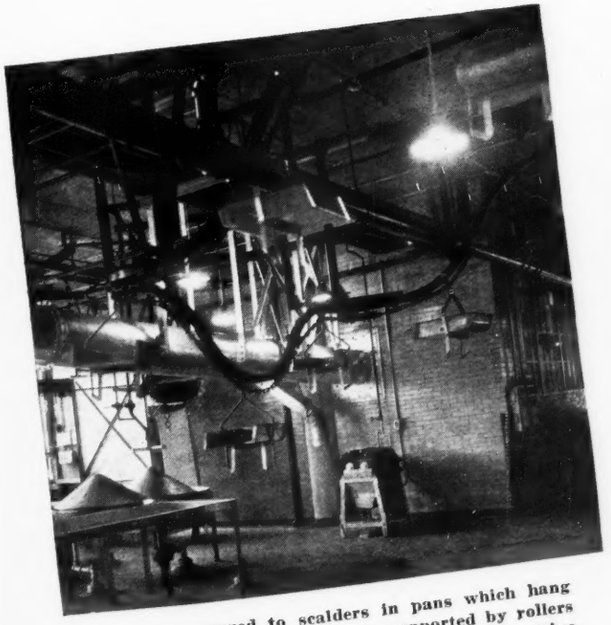
To automatically accomplish the switching operation, a photoelectric cell, or "electric eye," was installed. This is so arranged that a beam of light is broken by each carcass as it approaches the switching point. The electrical impulse created by this interruption in the light causes one of two electric thrusters to open or close a specially designed switch. As the beam is only broken when a carcass passes by on the conveyor, irregular spacing does not affect the switching operation.

So that the floor could be operated at varying capacities, it was necessary to make provision for the use of either one or both of the viscera tables. This called for the installation of some form of speed control and also synchronization of the several conveyor chains under these variable conditions. It being necessary to deliver carcasses from the two tables to a single conveyor in proper sequence and with proper spacing, a device had to be installed to compensate automatically for a change in space relationship. It was apparent that it would not be possible to start or stop the two viscera tables in the same time if one was loaded more heavily than the other. So frequent stopping and starting in daily operation would disarrange the carcasses with respect to their space relationship and might bring two together at the point where they feed onto the single conveyor, with disastrous results.

NO CONTROL SYSTEM had previously been developed to meet all of these conditions. So it was necessary to adopt a number of contrivances, each of which would meet some of the conditions, and to connect these electrically and mechanically so that the system would function as a unit. The first step was to equip each conveyor with a motor-driven variable-speed device. Then speed regulation was obtained by use of the well known method of changing the effective diameters of the driving and driven cone pulleys. The diameters are changed by opening or closing the two halves of the pulleys, this being done by a motor-driven adjuster.

The master control unit was attached to the hiding conveyor, from which delivery is made to the eviscerating tables. And the actual control system is nothing more than a method of providing accurate indication to the several units of any change in the speed of the hiding conveyor.

CARCASSES *a Day*



Tripe is conveyed to scalders in pans which hang from overhead chain. Chain is supported by rollers operating on I-beam track. These pans dump tripe into scalders automatically.

Discharge end of two-plane overhead conveyor which handles beef blood, which is used for pharmaceutical purposes.

To accomplish this, Selsyn transmitters and receivers were used. These units are similar to fractional-horsepower synchronous motors, and are so designed that the receiving motor will operate at exactly the same speed as the transmitting motor. To one of the drive shafts of the master unit on the hiding conveyor was connected a transmitter for each of the conveyor units controlled. Then the corresponding receiving units were located at the controlled conveyors. Each of the receiver motors drives a set of collector rings. Then, mounted on the same shaft, but running free of it, is a second set of collector rings driven from the shaft of the controlled conveyor. When the speeds of both sets of collector rings are the same, electric contacts on the rings maintain a definite relationship as to position. But with a difference in speed, as occurs when the controlled unit is not operating at exactly the same speed as the master unit, or hiding conveyor, the contacts move at different speeds and so come together. This completes a circuit through an auxiliary electrical system and brings the speed changing motor into action, the motor continuing to operate until the collector rings are traveling at the same speed. Then the contact breaks and the motor stops. Control of both the eviscerating tables and of the splitting conveyor to which the eviscerated carcasses are delivered is effected in this manner.

But this synchronization of conveyor speeds was not all that was required in the way of control. Since the "retained" as well as "condemned" carcasses are held on the splitting conveyor until they are split, provision had to be made to keep these carcasses from touching. This meant that they had to be switched from the eviscerating tables to the splitting conveyor in proper sequence and at definite space intervals.

TO MAINTAIN this space relationship, it was necessary to provide some means of moving one of the eviscerating units backward or forward with relation to the other. This enables one of the units to catch up if it is behind the other or to be slowed down if ahead, at whatever speeds the units themselves may be operating. This was accomplished by the use of a planetary reducer. With the outside case of such a unit held stationary, a fixed speed reduction, depending on the gear ratio, results. Revolving the case changes the reduction ratio, decreasing if when the case is moved in the same direction as the output shaft and increasing it when the case is moved in the opposite direction. By applying a motor drive to the case and controlling the motor, the conveyor may be moved ahead or retarded at all speeds. So accurate is this control that a change in space relationship of ½ in. brings the unit into action to make an adjustment.

The speed of the master conveyor, the hiding chain, is controlled by a button in the foreman's office. This sets the killing rate for the entire plant. And that rate is indicated by a tachometer which reads in terms of cattle per hour rather than feet per minute of conveyor speed.

At the normal killing rate, cattle are held on the floor about 48 minutes while the various operations are performed. Based on chain speed and length of travel, this time is divided as follows:

Bleeding conveyor.....	5 minutes
Heading conveyor.....	3½ minutes
Storage rail.....	5 minutes
Beds	6½ minutes
Half-hoist	6½ minutes
Hiding conveyor.....	6½ minutes
Eviscerating	7½ minutes
Splitting and washing..	7½ minutes

In addition to the overhead conveying equipment the two eviscerating tables on the killing floor are important. Made of endless belts of stainless steel slats, these tables are each 60 ft. long and 5 ft. wide. The men doing the eviscerating ride the tables, moving at the same speed as the carcass, which travels on the overhead conveyor alongside. The tables discharge the viscera into a stainless-steel spiral chute at the end. Any rejected paunches are thrown into an enclosed chute leading to the "condemned" room by a motor-operated hinged apron section. The spiral chutes for the "passed" paunches from both tables are connected to a common chute below the floor, as are the condemned chutes. The spiral serves to break the fall.

The offal floor, to which chutes deliver products from the killing floor above, is also equipped with the latest in efficient and sanitary materials handling equipment. Trucking and handling of the products has been minimized to a greater extent than heretofore by new devices for performing many of the operations and for conveying the product mechanically through the sequence of operations. Tripe, for example, after being cleaned and washed in the usual manner, is placed in a pan suspended from an overhead chain conveyor. This pan carries the tripe to either of two scalders on the opposite side of the room and discharges it automatically. The pans are open at one end and they tilt to discharge their load as they pass over the scalders. Tipping is accomplished by a metal framework which extends down from the sides of the pan and drags on the edge of the scalder inlet. After scalding, the tripe is forked into dump-bottom stainless-steel baskets which are lowered into and raised from the cooking vats by means of a traveling electric monorail hoist. The same hoist carries tripe to the finishing tables after it has cooled and dumps it there.

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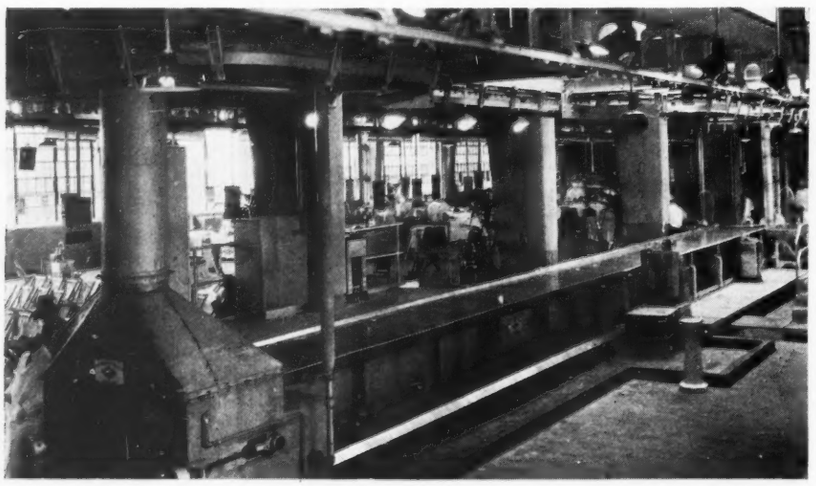

Carcasses move alongside viscera tables on overhead conveyors, and men riding on tables remove paunches and drop them onto tables. After inspection, viscera discharges into stainless-steel chutes at ends of tables.

Foods *Come In* Over the Tariff Wall

Tariff Commission report shows fruits and vegetables large part of food imports. Total volume small compared to consumption of these products.

THE IMPRESSION IS GENERAL that the United States is self-sufficient in the production of foodstuffs. Yet annually this country imports an enormous amount of some of its own most common vegetables and fruits. Practically all of these come in under stiff import duties that sometimes range as high as 100 per cent ad valorem.

The foregoing facts are disclosed in Volume No. 3 of a series of eleven volumes being issued by the United tates Tariff Commission under the title "Comparative Statistics of Imports into the United States for Consumption, by Countries, for the Calendar Years 1931-1935, Inclusive."

As indigenous as lima beans are to the soil of this country, nevertheless the United States imported in 1935 more than 5,000,000 lb. of that vegetable, on all of which, excepting that which came in under the Cuban trade agreement, a duty of 3½ cents a pound was paid. About 35,000,000 lb. of ordinary beans were imported at a tariff rate of 3 cents a pound, imports from Mexico and Chili each having been more than 10,000,000 lb. The report shows that in 1931 more than 42,000,000 lb. were imported.

Mushrooms are grown in most sections of the country. Yet last year the U.S. imported, chiefly from Poland and Danzig, more than 550,000 lb. of mushrooms at the almost prohibitive tariff rate of 10 cents a pound plus 45 per cent ad valorem. And one might think that last year's imports of potatoes, amounting to more than 15,000,000 lb., coming chiefly from Canada, were high, yet the figures disclose that in 1931 nearly 234,000,000 lb. were imported. The same duty was paid in each of the years—¾ cents a pound.

If there is a state in the Union that does not grow turnips, it has yet to be heard from, yet this country last year imported more than 99,000,000 lb. of that root vegetable, on which a tariff of ¼ cents a pound was paid, the equivalent ad valorem being 46 per cent. Practically all the turnip imports were from Canada.

Tomatoes to the extent of more than 78,000,00 lb. on which a duty of 3 cents a pound was paid (except those coming in under the Cuban trade agreement, on which the duty was 1.8 cents per pound), were imported chiefly from Mexico and Canada, the report shows.

Other vegetables imported last year included nearly 15,000,000 lb. of onions, on which a tariff of 2½ cents a pound was paid; more than 3,500,000 lb. of peppers, entering at a tariff rate of 2½ cents a pound and coming chiefly from Cuba and Mexico; and more than 2,500,000 lb. of pickled vegetables, on which 35 per cent ad valorem was paid.

In the line of canned vegetables, this country imported, nearly all from Italy, nearly 77,000,000 lb. of canned tomatoes, on which a duty of 50 per cent ad valoremm was paid; and nearly 1,000,000 lb. of canned pimientoes, chiefly from Spain, on which the duty was 6 cents a pound.

It took more than 55,000,000 bunches of imported bananas to satisfy the appetites of Americans last year. This amounted to almost a half bunch for every man, woman and child in the country. While for many years this country's chief banana imports came from Honduras, figures for last year gave the lead to Mexico. Other countries from which the United States imports large quantities of bananas are Cuba, Guatemala and Panama.

Imports of lemons are shown to be small, though last year there were imports of limes exceeding 7,000,000 lb., on which a duty of 2 cents a pound was paid. They came chiefly from Mexico.

Blueberries—more than 2,000,000 lb. of them—were imported last year from Canada, paying a duty of 1¼

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Senator Royal S. Copeland again introduces a bill into Congress to revise the Food and Drug Law.

It's S.5 *Again*

Latest Copeland Bill, to Revise Federal Food Law, Much More Satisfactory

ONCE AGAIN SENATOR COPELAND has introduced a new bill to replace the present Food and Drug Law enacted in 1906. Its number is S.5, just like its immediate predecessor which died in conference in 1936.

As a piece of legislative writing, the new S.5 is to be complimented. Even a layman can understand it. Quite a contrast to S.1944, on which one needed to spend a week of uninterrupted study before it began to be clear. S.5 (1937 model) also has a delightful innovation. It has a table of contents showing ten chapters and 32 sections, which in itself is most helpful to one who must discover what it is all about.

To make detailed comparisons between the new S.5 and the previous attempts to write a satisfactory piece of legislation would be time-consuming and not worth the effort for, after all, it is this bill and not the older one that is before the Senate.

In the House, Representative Chapman has introduced H.R.300 which is almost identical with S.5, save in one or two particulars that will need to be reconciled in conference. The big differences between the Copeland bill and the Chapman bill are in the matter of quality grades. Representative Chapman raises the old issue again.

Both bills give authority to the Secretary of Agriculture to regulate advertising. Nevertheless, the Federal Trade Commission is not expected to relinquish its prerogatives so easily, and a lively fight is anticipated, for the F.T.C. is a very powerful body.

An important feature of S.5 is Section 4, which will add a new enforcement method to the powers already in existence. Enforcement by injunction will be possible for every one of the ten prohibited acts. The U.S. District Courts can make the injunction temporary or permanent. Furthermore, any district court can enforce the injunction by contempt proceedings, no matter in what court the injunction was granted. No hearing before the Secretary, no warning, nothing.

The alleged offender can speak his piece in court. Whether telling it to the judge will be equivalent to a hearing remains to be seen. Presumably, however, it will be a quick-action remedy, apparently directed principally at advertising violations. And even if the offender quits violating the law, the injunction may be granted anyway. Publishers and advertising agencies are exempted from contempt proceedings if it can be shown that a violation of an injunction had gotten beyond their control.

S.5 designates itself as the Federal Food, Drug and Cosmetic Act. It calls the label anything on the container, on the package or in the package. And advertising is anything else done in an attempt to induce a person to buy.

Any form of advertising or sales promotion that is "false or misleading in any particular" is prohibited. Two separate paragraphs cover this prohibition: one for mail, radio or otherwise; the other is just to cover the "otherwise." This precaution seems to have been taken just in case one of them gets a black eye in the court, for obviously, if enacted, it will be the intent of Congress to interpret "otherwise" as meaning "by any means."

Of course, misbranding, adulteration, etc., are also prohibited.

OTHER PROHIBITIONS cover interstate shipments of food from plants which violate an emergency permit. This is a feature that some folks call the shellfish clause. It came about because of illness arising from bacterial contamination of shell fish, and if presumptive evidence is found that contamination exists, the Secretary of Agriculture can clamp down on the plant, make it toe the mark and operate under a permit or else shut up shop.

If anybody operating a plant tries to keep out a Federal food inspector, that little stunt will cost him up to a year in jail or $1,000 for the first offense; and on the second offense the price is upped to $5,000 and the

time is lengthened to two years.

Willful violation of the ordinary prohibitions such as misbranding, adulteration or false advertising, becomes still more expensive for here the price is upped from $1,000 to $10,000 and the time in the hoosegow increases to three years.

Dealers, involved in a violation, are exempted from penalties if they sell the goods exactly as received, have acted in good faith, and will tell all they know when asked about it.

The subject of seizures as proposed in S.5 is very interesting. Only one seizure may be made for misbranding of a minor sort, and if the claimant acts "seasonably" i.e., quickly, he can apply for a change of venue to a place near home and thereby save travel, expense and time. But if he has been caught up before and has lost his case, the government can gobble up everything of his that is misbranded. Or if the misbranding renders an article dangerous to health or if the misbranding is "in material respect, false, grossly misleading or fraudulent," the government can grab it all, anywhere.

Multiple seizures for misbranding or adulteration are possible under the bill, but it is also possible to consolidate all of the cases and have a single trial in any district agreed upon.

The courts can allow claimants to obtain samples of seized goods up to a reasonable length of time before the trial (Section 6 (C)); and when the government is collecting samples merely for analysis, the person named on the label can obtain a part of the official sample. (Section 25 (b).)

In court cases that are lost to the government, the claimant (if any) is stuck for court costs, fees, storage charges, "and other proper charges."

Where the bill covers criminal action against the individual, as contrasted to action against goods and things, the alleged offender has a chance to find out what it is all about and speak his piece at a hearing. This is a real break for the person who may have unwittingly committed a technical crime, and if the violation is a minor one and if the Secretary of Agriculture has reason to believe that the offender will go straight, he can be let off with a written notice or warning. Otherwise, the offender gains nothing by the hearing and has to stand trial. This provision, (Section 8) ought to do much to create a better feeling between the trade and the Food and Drug Administration, for under the existing law, the Food and Drug Administration has no option. It either has to litigate or keep quiet, or perhaps bluff.

Under S.5 the Food and Drug Administration is not the only body to start the courts into action, for Section 9 says in effect that if any state health or food officer, any county health or food officer, or any municipal health or food officer presents satisfactory evidence of violation to the U.S. District Attorney, he shall institute suit without delay. Of course, the D.A. must give the person a chance for the hearing prescribed under Section 8 before he acts. But under Section 4 he can apply for an injunction without a hearing other than whatever the judge chooses to listen to.

Food is to have a definition and standard of identity, and a reasonable standard (not standards) of quality and fill of container. In the House bill, however, quality grades are required.

Under adulteration, there is one clause that may need some explanations and revisions. Section 11 (b) 4 says a food is adulterated "if any substance has been added thereto or mixed or packed therewith so as to increase its bulk or weight, or reduce its quality or strength, to make it appear better or of greater value than it is." As it now reads, it sounds as if some very common foods could be declared adulterated, such as ice cream or mayonnaise in which air has been incorporated.

Misbranding of foods occurs, if the food doesn't conform to the definition and standard for that food, or if the food is not named on its label, or if it omits the names of optional ingredients that are permitted under the definition and standard.

Sub-standard and slack-fill are also incorporated in the bill, in Section 10, by authorizing the Secretary to promulgate regulations.

Proprietary foods must carry a list of ingredients on the label (nothing being said about the order of listing), but the Secretary of Agriculture is authorized to establish exemptions if such listing is impractical. However, proprietary foods for infants and invalids have to tell all, including vitamins, minerals and "other dietary properties."

Industrial packages are to be exempt from regulations under the labeling provisions if these packages are to be repacked or the contents processed. This appears to cover 140-lb. flour, barrels of frozen fruit, produce which crosses a state line en route to canneries, shiploads of fish, tank cars of oil, carloads of unlabeled canned foods, and the like, on condition that the food is not misbranded or adulterated upon its removal from the repacking, processing or labeling plants.

If the Secretary is to promulgate a regulation, he must hold a hearing not less than 30 days after giving appropriate notice.

REPORTS OF ALL JUDGMENTS are to be published as under the present law. However, if the Secretary thinks there is imminent danger to health or gross deception of the consumer in any situation, he can shout it from the housetops. And the collection or display of exhibits such as the "Chamber of Horrors" of recent memory is also authorized in Section 28.

One matter which was the subject of many a wordy battle in previous bills was that of safeguarding the manufacturer from regulations that are "unreasonable, arbitrary or capricious, or not in accordance with law," which may cause substantial damage to the manufacturer by their enforcement. S.5 handles it by authorizing the courts to enjoin the enforcements if the judge finds any of the foregoing conditions to be a fact or a conclusion of law.

The bill is to become effective one year after its enactment, but the Secretary is authorized to start at once on promulgating all the regulations, and announcing all the foods exempt from ingredient labeling, and also the definitions and standards of identity.

From the standpoint of the food manufacturer, this bill appears to be very satisfactory except for one or two trifles. It is hoped that it will be enacted promptly

No mention has been made of features of the bill that concern drug and cosmetic manufacturers.

▶ It is likely that a new law to regulate the food, drug and cosmetic industries will be enacted this time. The newest Copeland bill, bearing the same number, S.5, that it carried last year, is important to

All Food Manufacturers

Confectionery manufacturers use it both as a chemical process and as a unit operation to give soft, tender confections and candied fruits a sparkling appearance and to protect them against excessive loss of moisture and loss of good eating qualities.

By W. H. HAUG

Assistant Superintendent
Mason, Au & Magenheimer Confectionery Manufacturing Co., Brooklyn, N. Y.

Crystallizing May Have *Two* Meanings

AS THE CONFECTIONERY MANUFACTURER uses it, crystallizing has the object of protecting pieces of candy or candied fruit against rapid loss of moisture with retention of original soft and tender texture. It lengthens their "shelf-life" and their palate appeal as well as improves their surface appearance.

All of these results are obtained by covering the pieces of candy and fruit with a coat of small sugar crystals. When the operation is carried out correctly these sugar crystals seal in the moisture content of the confections; "graining" and hardening are delayed; and the good eating qualities remain for a considerable longer period of time than is the case with uncoated fondants, gums, and candied fruits.

If the operations are not carried out correctly the coating of sugar crystals either does not form or it readily breaks off after the confections are dried.

Crystallizing of confections and fruits depends upon the chemical property possessed by sucrose (refined cane or beet sugar) to separate out in crystal form from supersaturated solutions and to form an almost moisture-proof covering on the confections.

In explanation of the term "supersaturated," it is known that sugar dissolves in water at ordinary room temperature (70 deg. F.) in the ratio of about 2 to 1 parts by weight. Such a solution contains about 67 per cent of sugar and 33 per cent of water by weight and is said to be saturated at the temperature of 70 deg. F. If, however, the temperature of the solution be raised, an additional quantity of sugar can be dissolved before the saturation point for the higher temperature is reached. At 140 deg. F., enough sugar will dissolve to give a syrup containing about 74 per cent of sugar by weight.

If such a solution is gradually cooled, we might well expect that the sugar will start to form crystals the moment the temperature of the solution falls below 140 deg. F. This, however, is not the case. The solution can be cooled considerably below the saturation point without the formation of crystals and the solution is said to become supersaturated. If sugar in solid form is sprinkled or placed into the supersaturated solution, the formation of crystals on the surface of the solid sugar will start.

This is what takes place when crystallizing syrup is run over pans or baskets filled with fondant or gum confections in a candy plant. It is the process part of the crystalliz-

Based on paper read before Production Forum of National Confectioners' Association Convention in New York City.

ing of candies and fruits. The crystallizing syrup is in a supersaturated state at the temperature of the crystallizing room and the confections to be coated supply the sugar in the solid form.

Successful crystallizing depends to a large extent upon the use of pure sugar, good water, proper heat application, and care of the crystallizing syrups after they are made.

In general, two methods of carrying out crystallizing operations are used in the candy plants of today. Both methods involve exactly the same basic principle and differ only as to the type of equipment used. One method is known as pan crystallization and the other as tank crystallization. The syrup making is the same for both methods.

Sugar of highest quality,—one of the special coarse-grained sugars made especially for the confectionery industry—is melted in a kettle or tank that is usually provided with an internal coil fitted with both steam and cold water connections. The generally accepted proportions are 74 per cent of sugar and 26 per cent of water by weight. Low pressure of process steam should be kept on only until the sugar is completely dissolved, because as long as the syrup remains at a high temperature there is a progressive destruction of sugar with the formation of invert sugar and coloring or caramel. After the sugar is dissolved, cold water is circulated through the coil until the syrup is cooled down practically to the temperature of the crystallizing room. This procedure results in the formation of a supersaturated solution.

In the older process of pan crystallization, the centers to be coated are placed on a wire grating that rests on the bottom of a small rectangular pan. A wire frame is placed over them to prevent floating, and syrup is carefully ladled into the pan until the centers are completely covered. The pans are allowed to remain overnight, which is usually long enough to build up a crystal coating of desired thickness. For a heavy coating it may be necessary, however, to repeat the process. When crystallization is completed, the excess syrup is poured off and the confections are turned out to drain; usually into a "V" shaped trough.

The newer or tank method lends itself to large scale production. In operation, the centers to be coated are placed in wire baskets which are stacked one upon another in a good-sized tank. The top basket is left empty. Syrup is introduced at the bottom of the tank and the level rises slowly until the uppermost baskets are immersed. After crystallization is completed, syrup is drawn off and the baskets are permitted to drain. The confections are then carefully "knocked out" and placed in trays to dry.

In either method the crystallizing syrup loses about 3 per cent of its sugar content. By restoring the sugar content to the original 74 per cent, the syrup may be used again and again until it has been used several times, provided it was originally made from a high quality "strong" sugar and water with very little or no mineral content and that it has been properly handled. Overheating is especially to be avoided. Also there should not be more heating than is absolutely necessary at any time. As previously stated the sugar content of syrups is undergoing a progressive deterioration during all the time that the syrup is subjected to heat. This deterioration proceeds very slowly, especially at first, but nevertheless it is certain. Excessive heating of the syrup results in an increase in invert sugar content which finally begins to break down with the formation of acid substances and coloring matter.

While invert sugar is a highly desirable ingredient in certain candies, it most certainly should be avoided in crystallizing syrups. Even without overheating, prolonged heating and continued reuse of the crystallizing syrup also cause an increase in the invert sugar content of the syrup. Eventually a point is reached when the invert sugar content amounts to about 2 per cent of the syrup. Beyond that concentration, as brought out by Dr. Stroud Jordan in "Confectionery Problems," it may be difficult, if not impossible, to obtain satisfactory crystallization. The syrup may also become too highly colored to be useful. With proper handling this should not occur until after the syrup has been used and brought back to its original sugar content several times. In the absence of laboratory control for the routine determination of invert sugar in the crystallizing syrup, dependence must be placed largely on experience. If the same grade of sugar and the same water is used experience should be a fairly reliable guide.

THE SUGAR CONTENT of crystallizing syrup may be restored after each use either by boiling off water until the original ratio of 74 per cent sugar and 26 per cent water is reestablished, or by adding the necessary small quantity of a very concentrated syrup made specially for the purpose.

The boiling method was formerly the only method of restoring crystallizing syrups to their original strength. It is still frequently used. But, it should not be used except in a vacuum kettle. The high temperatures required for boiling at atmospheric pressure will be very destructive to the sugar, even during the short time required to evaporate the necessary 3 per cent or so of water. When the boiling method is used under the supervision of a technologist to control the hydrogen-ion concentration of the syrup it permits using the syrup for a greater number of crystallizations.

The better way is to add a relatively small batch of concentrated syrup made up as required for the purpose of restoring the sugar content of the crystallizing syrup. Such concentrated syrup is made by heating sugar and water respectively in the proportion of 85 to 15 parts by weight, until solution is complete. It may then be cooled slightly, but not sufficiently to start crystallization, before stirring into the large batch of weakened syrup until the latter again reaches the original sugar percentage as determined with a hydrometer or Baumé gage.

Concentration of the syrup to 33 or 36 deg. Bé. will affect the size of the crystal. Syrup of the higher degree gives the large crystals; the lower degree gives the small ones. The temperature of the syrup when

(*Turn to page* 106)

▶ ***As a unit operation in food engineering, crystallizing has to do with the mechanics of covering food or confections with a layer of crystals, usually, if not always, sugar crystals.***

Procedure discussed in this article for successful use of this operation is of value to manufacturers of:

Candied fruits
Fondant, gum and jelly confectionery
Rock candy
Sugar cubes or tablets

PRESSURE PROCESSING *Dairy Products*

BY M. E. PARKER
Manager of Production, Beatrice Creamery Co., Chicago

One type of pressure processor. An indicating thermometer is located in the end of the heating tube (lower right) within which steam is mixed with milk under pressure. It is controlled by regulating the valves directly above the thermometer.

The hot mixture is cooled by expansion within the vacuum chamber (right) while the vapors pass out into the separator in the upper left. The separated liquid is returned to the vacuum chamber through an equalizer line, while the separated vapors are condensed in the condenser immediately below, from which they are continuously withdrawn by the vacuum pump beneath the condenser. The motor, mounted on the base at the right beneath the vacuum chamber, supplies the milk continuously to the heating tube. The pump mounted on the left side of the base continuously withdraws the processed milk from the vacuum chamber.

DURING RECENT YEARS, pressure processing has been developing in the dairy industry. Certain advantages, which accrue when subjecting dairy liquids (such as milk or cream) to the influences of a progressive yet properly synchronized order of variable pressure conditions, have given considerable impetus to the development of different processes of this type. It is not the purpose of this article to discuss any specific process but rather to deal with the subject in its broadest aspects because of our conviction that pressure processing will soon assume considerable importance not only in the handling of dairy liquids but also in other fluid or plastic food products as well.

Briefly, pressure processing of dairy liquids in its present stage of development has generally involved subjecting the dairy liquid to a short-hold (short holding time), high-temperature pasteurization while maintaining the heated liquid at a pressure of one or more atmospheres, followed by a subsequent, spontaneous expansion of the heated, compressed liquid in a partial vacuum. The conditions of application vary with the final product sought. For example, the pressure processing of cream for buttermaking will require a different degree of application than that of milk for making Cheddar cheese. Furthermore, variations in the degree of application of pressure-processing for a given product may some time be required because of seasonal or sectional variations in the quality of the raw supplies (e.g., milk or cream).

Pressure processing has really developed because it provides a necessary step in the progress of processing of dairy products upon which the future scientific advancement of the arts doubtlessly will be predicated. Up to the present time, advancements in pasteurization have revolved almost entirely around mechanical improvements which have been concerned primarily with the accuracy of temperature and time controls. In recent years there have been many noteworthy advances in the precision control of these essential factors in positive pasteurization. Electrical appliances have played an important role in this "control era" of pasteurization.

"Control era" is stated advisedly because, for nearly the past decade and a half, attention has been primarily centered on the proper guarantee of positive pasteurization. This emphasis dates from the 55th annual

meeting of the American Public Health Association at Buffalo, N. Y., in 1926. At that convention, the classical papers of Engineer Putnam and Sanitarian Franks pointed out the many glaring evidences of a widespread inadequacy of pasteurization control. All who attended those meetings and heard those papers could not help but recognize that the ushering in of a "control era" was demanded in the interest of the public health. Because of the vital character of those earlier studies the dairy industry, as well as the public health official, became immediately cognizant of its responsibility to the health of the community and forthwith both devoted diligent attention to insuring positive pasteurization.

With all this necessary focus of attention on the details of pasteurization control, there has been relatively little development in the scientific aspects of the processing of dairy liquids. By "processing" is meant the combination of the pasteurizing and subsequent steps in the preparation of the final products, including cooling, conditioning, aging and other physical and biochemical phenomena.

After all, pasteurization is only one step in processing, although it is the most vital one from the health viewpoint. Accordingly, its necessity can be neither disputed nor minimized. On the other hand, the dairy products manufacturer must view pasteurization also with an eye to its influence on the market appeal of his final product. If he can, by any fortunate set of circumstances, combine positive pasteurization with advantageous physical influences, then both the industry and the consuming public can be better served. Even at the risk of repetition, let it again be stated—with emphasis—that in the processing of a dairy product, *pasteurization is only one step,* but is the most vital one as far as the public health is concerned. Therefore, any advancements in the processing of dairy products cannot ignore the importance of positive pasteurization. Yet if its application can be augmented with the beneficial effects of other physical influences, both the industry and the consuming public will be rewarded with better dairy products.

In the foregoing paragraph, the importance of positive pasteurization has been stressed from the viewpoint of the public health. Pressure processing involves a short-hold, high-temperature treatment coupled with a subsequent introduction of the pasteurized liquid into a partial vacuum or, more accurately stated, a zone of reduced pressure. This sequence of steps has a substantial experience in the processing of dairy liquids as its guide.

ONE of the most important factors vital to the body and general physical character of a dairy product is the rapidity of cooling following its pasteurization. While the speed with which a dairy liquid is cooled is extremely important, so likewise is the degree, extent and rapidity of heating also important. For example, slow heating plus long periods of holding at a high temperature is apt to destroy, or seriously impair, the physical character of a dairy product even if it be cooled rapidly. In southern sections of the United States, butter made from cream being so processed will invariably develop mealy texture due to imperfect crystallizing of fat which oils-off during prolonged heating, or because of too high a pasteurizing temperature. In other sections where the cream is inherently of relatively firmer body, the manifestation of prolonged heating or delayed cooling, or both, is observed in what the buttermaker calls "salvy" body. A good "cream line" in market milk is markedly influenced by the rapidity with which the milk is cooled after pasteurizing. Cream line also can be impaired by prolonged heating and can be positively eliminated by too high a pasteurizing temperature. In cheese making, pasteurizing the milk at too high a temperature will harden and dry the curd which prevents its proper "matting" in the cheese vat.

Dairy engineers have discovered that many of these defects in dairy products are traceable to the method of heating the dairy liquid. For example, most of the heating is done by means of circulating a heating medium in a jacketed container around the liquid mass which absorbs heat from the heating medium by virtue of the conductivity of the metal used in the construction of the container. In earlier days, a relatively hot heating medium (in some instances, steam) was used for heating a relatively cold liquid mass. This naturally resulted in superheating some of the dairy liquid—that is, "superheating" in the sense of imparting undesired physical and organoleptic characteristics (characteristics discernible by the senses) to the dairy liquid under treatment. More recently, this disadvantage has been largely eliminated by circulating very rapidly a heating medium having a temperature substantially that of the pasteurizing temperature.

ONE of the more efficient, and incidentally, most recently developed methods of pasteurizing with relatively low temperature heating mediums is the so-called "plate pasteurizer." The plate pasteurizer consists of a large number of plates suspended in a frame. The plates are pressed in such a manner as to form channels. On one side of the plate, these channels direct the flow of the milk being heated by the heating medium (hot water or heated milk) circulating through the channels on the other side of the plate. Also, in the plate pasteurizer the milk moves in an entirely closed and definitely directed channel and is heated from two sides by the heating medium coursing through another entirely closed and separated, definitely directed channel. The directions of flow of the milk being heated and heating medium are countercurrent to each other. Furthermore, the plate pasteurizer provides the advantage of pasteurizing and cooling the milk in an enclosed system in such manner that the heat from the newly pasteurized milk is utilized to preheat the cool raw milk (with a corresponding cooling of the hot, pasteurized milk). Thus, a regenerative pasteurization is provided in a machine which combines economy and continuous performance with accessibility and ease in cleaning.

▶ ***Something relatively new is this application of direct steam to fluid food products to pasteurize them. A most important adjunct to direct heating is the flash cooling in a partial vacuum. Processing times are measured in seconds, not minutes. This unit operation appears to have promise for***

Fruit Juices
Syrups
Vinegar
Milk
Milk Cooling
Cream
Ice Cream Mix
Proussed Cheese
Salad Dressing

However, the foregoing method and other earlier indirect methods of heating naturally cannot be as rapid nor as efficient as a method which actually mixes the heating medium with the dairy fluid. Obviously, this would be impossible when the heating medium is hot water because of the dilution which would seriously affect the characteristic qualities of a dairy product so treated.

In pressure processing, the heating is accomplished generally by mixing the dairy liquid with dry steam having a substantial pressure (e.g. 80 to 100 lb. gage pressure). By subjecting the mixture of liquid and steam to the proper pressure, it is possible to pasteurize the dairy liquid at what would otherwise be inordinately high temperatures; for example, 230 to 250 deg. F. and even as high as 300 deg. F. The mixture can be held at this temperature for varying intervals—from 2 to 3 up to 15 to 25 seconds—without permanently imparting a scorched flavor to the dairy product. Actually, these high temperatures are being used advantageously in processing cream for buttermaking, although they cannot be used equally as satisfactorily for other purposes. For example, in some cheese-making applications, a pasteurizing temperature of 170-175 deg. F. ordinarily is the highest to which it is possible to go with conventional methods, although in pressure processing a pasteurizing temperature of 190 deg. F. has not been found seriously to impair the "matting" properties of the curd.

From the foregoing, one must not get the impression that the benefits of pressure processing are assured only by the high temperatures and pressures employed in the pasteurizing step. True, the high pasteurizing temperatures are made possible because of the increased pressure to which the dairy liquid under treatment is subjected. Without the application of this hydraulic pressure, the dairy liquid would be hopelessly damaged beyond repair due to the drying and charring effects which would result as, for example, in heating milk above boiling by indirect methods of heating. The advantages to the treated liquid accrue from the rapid heating possible in the pasteurizing step because of the supplementary action of the increased hydraulic pressure *plus* the rapid—in fact, practically instantaneous—cooling which results when the compressed, heated liquid is caused to expand suddenly. The latter is due to the evaporating effect resulting when the hot liquid is introduced suddenly into a partial vacuum, or if you please, a reduced pressure.

THUS, we begin to appreciate that the rapid heating and cooling effects made possible by increasing and reducing the pressure of the liquid under treatment are, in themselves, the controlling factors in pressure processing. No more rapid—and for that matter, no more positive and thorough—method of heating a liquid than by the introduction of steam into a liquid under increased pressure is known to science. Conversely, no more rapid—and also, no more positive and thorough—method of cooling a liquid than that provided by its expansion under reduced pressure has yet been devised.

It has long been a maxim in the processing of dairy products to heat and cool as rapidly—and as safely for health's sake—as possible in order to preserve maximum physical character. In the earlier days when pasteurization was first being introduced in the dairy industry considerable damage was encountered with the application of flash pasteurization. Inadequate heating of the dairy liquid, both with respect to its effective temperature, and thoroughness of penetration to every particle of the liquid, was responsible in large measure for its necessary condemnation by health authorities. The tendency of flash pasteurization to overheat as well as underheat rendered its early application problematic to the industry. The holding, or vat, method followed later by the tubular heaters and, finally, the plate pasteurizer came into their own primarily because they permitted better temperature control.

The heating of milk or cream by the direct injection of steam normally is objected to both by the industry and the health official because of the dilution resulting from the condensation of the steam. This objection does not apply to pressure processing inasmuch as it is possible to control dilution in whatever degree desired. In other words, by the proper preheating of milk or cream by indirect means, it is possible in its subsequent pressure processing to have slight dilution, no dilution, or, if desired, an actual concentration of the liquid under treatment. This fact should effectively assure health authorities because high-pressure dry steam, which merely passes through a mass of milk or cream without diluting it but leaves behind a treated liquid to form the basis for a final product of improved character, is surely a commendable process. The only problem which might confront the health officer would be that arising from the chemical character of the steam itself. Steam from water which has undergone extensive boiler treatment might properly require his scrutiny. However, suffice it to state that effective treatments to render even the most stubborn feed water innocuous from a public health standpoint are abundant.

Physical benefits derived from pressure processing are due primarily to the rapid heating and cooling systems therein provided. Physical and biochemical effects have not been discussed largely because they are not yet fully understood. A virgin field

(*Turn to page* 107)

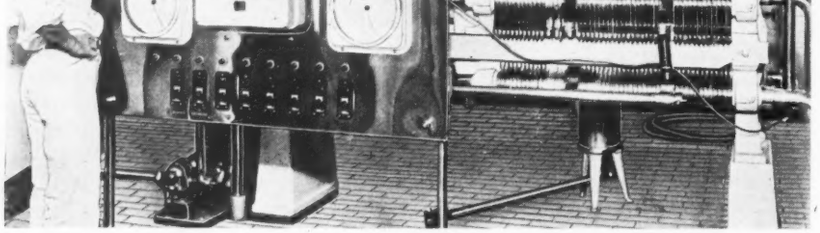


Plate pasteurizer—At left center is seen the control panel for the plate pasteurizer seen at right center. The operation of this type of pasteurizer is explained in the text of this article.

Here's One Way to Get

BETTER QUALITY CONTROL IN SMALL PLANTS

An industry with several thousand scattered members takes process and quality control directly to the plant door.*

DO YOU REMEMBER the old saying that, when the mountain would not come to Mohammed, Mohammed decided he would go to the mountain? That explains exactly what ABCD has done, in developing its traveling laboratory service for its members in the carbonated beverage industry.

A technical laboratory service has been available to members at association headquarters for a number of years. Also, a research fellowship has been maintained at Iowa State College fo some time.

However, for one reason or another, many bottlers have not been able to make full use of this service. The larger bottlers who do not employ special experts, have been more inclined to make use of the service. These have benefited greatly, as have a relatively smaller number of small bottlers. However, a large number of those who could be materially assisted have limited their contacts to an occasional question. Provision has therefore now been made to bring the service to the door of the individual bottler.

Several years ago the state association in Minnesota requested that the ABCB assist in a survey of the bottling industry in that state. Arrangements were made for the fellowship and the service laboratory of ABCB to cooperate with the Food and Drug Division of the State of Minnesota, and with the Minnesota Bottlers of Carbonated Beverages. Under this arrangement 29 plants were visited and studied. Experience derived from this survey forms the basis of the present plan.

Also, two other ventures of this nature are known. The first of these has been carried out by the National Canners Association which employs a truck to carry equipment about from plant to plant. When this truck arrives at a plant that is having trouble, the equipment is unloaded and set up inside the plant.

The second is a governmental venture, going to a limited number of Swiss type cheese manufacturers. Its purpose is to boost the quality of the product manufactured.

These experiences were studied and it was decided to make the ABCB laboratory a complete unit, which could operate at any plant without unloading any of the equipment. It is equipped to carry out all of the most important tests that need to be made in order to overcome the most usual difficulties that are met in beverage plants. It will operate under the direction of the writers.

(*Turn to page* 107)

* Digest from "Technical Service on Wheels." by Max Levine, Director, ABCB Research Fellowship, Iowa State College, Ames, Iowa, and John M. Sharf, Director, Technical Service, ABCB, Washington, D. C., a paper read before the annual meeting of the American Bottlers of Carbonated Beverages, Chicago, Ill., Oct. 19–23, 1936.

Because of the large volume of bulk malt handled by the Jacob Ruppert Brewery in New York City, one separate power unit is used to load tank trucks without vacuum pumps. Here the power unit is loading one tank truck while the second truck is waiting to be loaded. Delivery of the malt is made at the brewery by gravity without the services of the power unit. Each truck tank has a capacity of 700 bushels of malt.

AIR *Loads* Trucks —Also *Unloads* Them

System Developed as Brewery Aid Has Many Other Applications

DEVELOPED ORIGINALLY as an aid to the brewing industry, the Holly system of pneumatic truck loading and unloading may have many applications in the handling of bulk food products. To date it has reached its highest development in the transfer of malt in bulk from rail to brewery.

The method has also been used in the movement of grits. It is adaptable to the handling of any granulated material. Under certain conditions it could handle grains of all kinds; granulated sugar; milled flour; humus or even fertilizer.

Because of the greater work required in the movement of solids as compared with fluids, a vacuum is produced in the truck tank for its loading. Unloading is done by gravity or by putting the tank under pressure through reversing the vacuum pump cycle.

While the pneumatic conveyor for granulated solids is not new, its application to a mobile, self-contained motor truck dates back only to 1932. Greater impetus was given to further development by the legalization of beer. Today the system is considered one of the outstanding contributions to the brewing industry since its legal revival.

Malt is one of the brewer's most important raw materials. The handling of malt shipments has been until now an item of expense considered more or less set. If the brewery has its own railroad siding, malt may be purchased in bulk at considerable saving. Unloading may be made direct to the storage bins by gravity or by using the plant conveyors.

However, for breweries without railroad sidings, the only method of transporting and receiving malt has been in bags until the advent of the Holly system. A recent survey indicated that there were over 400 breweries so situated without sidings that rail shipments required additional handling before final delivery into the plants. For such breweries the use of the Holly system permits the purchase of malt in bulk and the discontinuance of the almost primitive method of handling in small-quantity bags.

Malt in bags costs more than in bulk. To load the 850 bags from a box car to trucks; unload them at the plant and empty them into the receiving hopper requires considerable equipment, time and labor. In one instance where the rail siding was one mile from the brewery, it took five men and two trucks 8 hours to unload the 850 bags. With a Holly system tank truck having a capacity of 300 bushels or approximately 110 bags, the same work was done in 8 hours with one man.

Other minor items of expense in handling malt in bags include the cost of counting, bundling and returning the empty bags. Still another expense is the loss of malt due to bag breakage. Additional loss occurs in spillage while emptying the bags at the plant. Also, malt sticks to the inside of the returned bags. It has been estimated that these minor

losses combined are equivalent to 10 bushels from each carload of malt shipped and handled in bags.

The disadvantages enumerated are important in the increased cost of malt delivered in bags. However, they are second in importance to the possibility of moisture getting into the malt during handling. No chances are taken in unloading bagged malt in rainy weather. If moisture gets into the malt, it is subject to contamination or spoilage. Contaminated malt due to moisture is many times the cause of off-taste in a brew. Brewers have been known to skip a brew rather than run the chance of getting moisture in the malt by unloading the bags in rainy weather, even when the needed supply is on the rail siding.

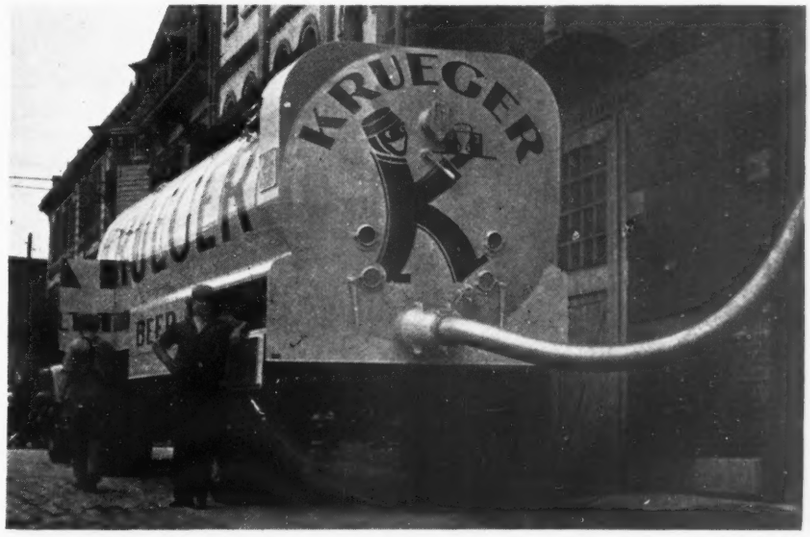
But with the Holly truck system, the bulk malt is not exposed to the atmosphere from the time it is unloaded at the box car. Thus, handling is independent of weather conditions. Unloading can be carried on at any time without fear of damage or contamination. There is no spillage at the siding or plant. There is no loss due to malt sticking to empty bags. There are no bags to be counted, bundled and returned.

The equipment has been developed by L. F. Holly, a native of the famous beer city of Munich, Germany, and president of the Holly Pneumatic Systems, Inc., New York City. It consists briefly of a cylindrical tank; a vacuum pump; two screw conveyors and a hose connection used for filling the tank and later for emptying it. The entire equipment is mounted on a truck or trailer chassis to suit the capacity of the tank. These range in size from 200 to 600 bushels.

The system handles the malt without dust or damage on much the same principle as a large vacuum cleaner. In operation, the vehicle is driven to the rail siding. It is spotted opposite the door of the box car.

The truck driver then attaches one end of the suction hose to the intake connection at the top of the tank at the rear. The other end, fitted with a nozzle, is submerged in the malt in the car. The vacuum pump is then started. This puts the tank under a vacuum which sucks the malt into the tank. When the latter is full, the pump is shut off by an electrical control switch.

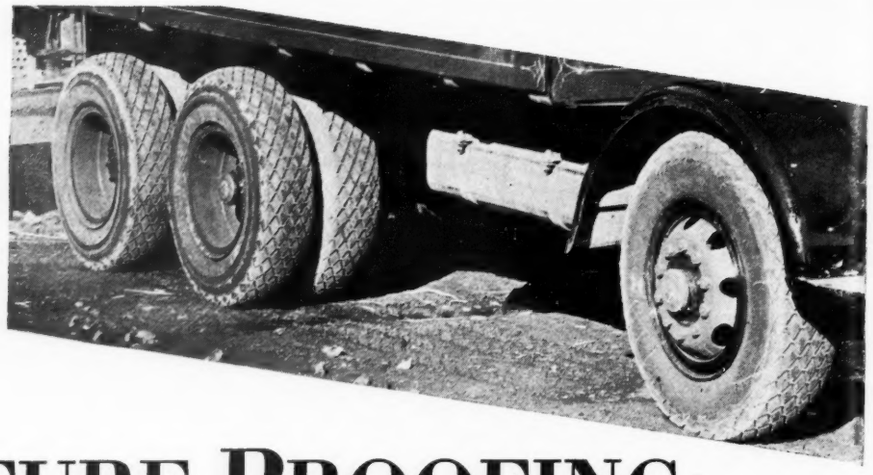
The vehicle is then driven to the brewery. The hose is attached to the discharge outlet. If the delivery is to be made by gravity to a point below the level of the tank, the malt is fed to the discharge hose by the two screw conveyors which extend longitudinally below the bottom of the tank. If the delivery is to be made above the level of the tank, the discharge is made through the same hose by putting the tank under pressure by reversing the action of the vacuum pump. The latter is driven by a separate gasoline engine. The screw conveyors are driven by the engine through a power take-off.



The unloading operation of the Kreuger semi-trailer malt tank truck. By reversing the action of the vacuum pump which sucks the malt into the tank, the malt is discharged under pressure into the storage bins above the level of the tank.

One of the latest Holly pneumatic loading units consisting of a tractor and a semi-trailer to give a larger tank capacity than can be mounted on a conventional two-axle truck. The cylindrical tank is covered by the sheathing as shown. The outfit pictured is owned by the Krueger Brewing Co., Newark, N. J. It is shown being loaded from a box car.

What Executives Say About



PUNCTURE-PROOFING

ASK THE MEN WHO USE THEM. That is the best way to find out whether it pays to use puncture-proof tubes or puncture-sealing compounds. So the following opinions of men whose companies operate fleets of trucks will be of value to others who must decide whether or not to equip their trucks with "shoes" that will not go flat.

Other opinions on this same subject appeared in this department in November and December, 1936, and in January, 1937.

Prevent Delays on Road

Freedom from road delays due to tire trouble is the real value of puncture-proof tubes or puncture-sealing compounds.

Puncture-proof tubes are far more satisfactory than puncture-sealing compounds although more expensive. The compounds are affected by temperature changes and often "creep" within the tube due to heat. There are two general types of puncture-proof tubes: (*a*) compression (*b*) compound-sealing. The former has a layer of soft rubber which is applied while the tube is inside-out. So when the tube is completed, this layer is inside and is under compression. The compound-sealing type has a gummy substance placed inside it. It is essentially the same as a common tube with puncture-sealing compound and has its drawbacks.

Puncture-proof tubes justify the extra cost in any type of service where delays are costly. Often a puncture-proof tube will outwear a number of sets of tires.

The extra weight of puncture-proof tubes does not reduce the mileage obtained from tires. The only possible disadvantage is necessity of balancing front wheels of some passenger cars after the puncture-proof tubes have been installed.

It is the more satisfactory and economical to use puncture-proof tubes with no spare. A spare is unnecessary on a vehicle equipped with puncture-proof tubes, and it is common practice with some large fleets to do without it.—*American Cone & Pretzel Co., Philadelphia, Pa.*

Tubes Good Investment

Puncture-proof or puncture-sealing inner tubes protect the tires from premature failure caused, many times, by small objects puncturing the tire and thus permitting the air in the tube to gradually leak out. This, naturally, puts an extra strain on the tire, due to the fact that the driver does not realize that his tube is slowly leaking. Later on, when he discovers that he has a flat tire, in many cases the tire is ruined.

So far, no safe, sure, puncture-sealing compound has been placed on the market that we know of. The puncture-sealing inner tube, however, has been tried for years and has proved economical to those who have made proper use of it.

The benefits of puncture-sealing tubes justify the extra cost alone in the elimination of delays caused by flat tires. In addition, these tubes will last longer than the ordinary type, which means a very good profit on the investment.

The extra weight of puncture-proof tubes does not, in any way, decrease the mileage obtained from the tires. In fact, these tubes add to the average life of the tire, due to the elimination of many punctures which cause premature failure of tires.

If the trucks are used in local service and the operator is equipped with a service truck, then no spares need be carried. However, in most fleets, good used tires with ordinary tubes are available and can be used to very good advantage as spares, thus eliminating any extra service calls, should a tire be cut or go flat.—E. BARBER, *Sales-Service Department, Abbotts Dairies, Inc., Philadelphia, Pa.*

Cost Not Warranted

Our experience with puncture-proof tubes really is not great enough for us to intelligently answer the question. But the little experience we have had in certain restricted areas makes us believe that the extra cost of these tubes is not warranted.—A. E. UDELL, *Purchasing Agent, Kellogg Co., Battle Creek, Mich.*

Not Worth Cost

Our trucks operate within a radius of a very few miles of our plant and do not carry spare tires. We have never used puncture-proof tubes or puncture-sealing compounds. We believe that the additional cost of puncture-proof tubes is greater than their value to us.—W. W. BLAIR, *The Dairymens Milk Co., Cleveland, Ohio.*

ACCURATE INSTRUMENTS
For Quality Control

On Testing and Buying Measuring Apparatus

YOU WOULD NOT ALLOW a mechanic to cut a shaft or a piece of pipe to a definite measure if his foot-rule had inch-marks that were actually varied anywhere from $\frac{7}{8}$ to $1\frac{1}{8}$ in. apart. Of course, this is an overstatement, for foot-rules never have any such errors of that magnitude. Yet it illustrates an important principle.

Most food plants use many other forms of measuring instruments. Many times there is great need of a very high degree of accuracy if costs or quality are to be rigidly controlled. This is especially true of instruments such as mercury thermometers, hydrometers, hygrometers, graduated cylinders, measuring cups, pressure gages, vacuum gages and the like. All too often they are purchased and used without further testing to determine just how accurate they may be.

Sometimes some suprising results are obtained by careful laboratory check-ups on this point. Even food containers have been known to be so inaccurately made that they have failed to hold the net weight of contents for which they had been designed. Though this is very rare, it is probable that for every such case there are a hundred where someone has failed to specify sizes correctly when the purchase order was placed.

Don't Guess When You Can Know

The fact that an instrument is new and just received from the maker is not a guarantee of its accuracy. Nevertheless there is a reasonable presumption that it is accurate, especially if you *know* that the instrument maker is reliable. Those who are responsible for quality-control should never take anything for granted, however.

You cannot often afford to put a new instrument into use without first testing it. It is to be hoped that no one will misunderstand the motive for so bald an assertion. We ourselves have been so badly fooled in the past by inaccuracies that, like the child which has been burned, we dread a repetition of it. The most glaring example of an inaccurate instrument in our own experience occurred quite some time ago, about 1910, when we were working with a thermometer from a set of instruments that bore the seal of inspection and test of the U.S. Bureau of Standards. Now almost anybody would accept such a thermometer as accurate. Yet we were puzzled by the results. They didn't make sense. And then we checked up and found that it was off exactly 20 deg. C., which is 38 F. degrees out of line!

Lest You Forgot

Under pressure of day-to-day problems, one is likely to forget a good suggestion unless he is able to use it at the time. For example, there is the means by which Kroger saved no less than a million dollars a year. How this was done was described in "Saves a Million Dollars a Year in Truck Transportation Costs," September, 1934, page 398.

We will not attempt to explain how such a condition could exist. It was enough, however, to make anyone skeptical forever after. Inaccuracies as great as this are usually easily detected. It is the slight inaccuracies that give real trouble.

Premium Price for Accuracy

Recently the director of a large laboratory told us of his problem of standardizing and testing all kinds of instruments used in the production department. He regards it as absolutely necessary to test every instrument but the cost of making huge numbers of tests became a burden. The number of rejects at one time grew to such proportions that he proposed a premium of 50 cents on the price of every hydrometer if the maker would accept a penalty of $2 for every reject. The instrument manufacturer agreed and now all the instruments received are accurate.

But the buyer continues to test the instruments. Nothing is left to chance. Quality is controlled—not left to pseudo-scientific guesswork.

Several questions arise at this point. What becomes of the factory rejects? And, is too sharp bargaining by purchasing departments responsible for poor quality of instruments? Is the 50-cent premium over the purchase price the thing that insures better quality, or is it the $2 penalty?

One cannot help believing that chiseling will defeat its own ends. One may "steal" a thing for an absurdly low price once but, where the item is one on which many repeat purchases are made, the seller can often figure out ways to make ends meet. And usually he does.

Control and measuring instruments are too important in production and quality control to warrant the use of anything but those of suitable accuracy.

"Ear Defenders" for Efficiency

FOOD PLANTS are not often noisy places, but we have had personal experience in a few where the racket was disturbing. It would appear logical to assume that such noise also distracts the workers, but now it is known to be a measurable and often unnecessary handicap to good efficiency.

In England, tests of the effects of noise have been carried out over eighteen months (Report No. 70, Industrial Health Research Board). When "ear-defenders" were placed on male workers in noisy weaving sheds, their efficiency was increased by as much as 12 per cent with an average of $7\frac{1}{2}$ per cent. (One very noticeable effect was that of calming irritable persons.)

Perhaps this would be a matter worth looking into in our own industry.

When Floods Come . . .

UNPRECEDENTED FLOODS in New England and Ohio Valley, in the spring of 1936, brought many food manufacturing plants face to face with a sudden emergency. Many things had to be done in a great hurry in order to keep essential food supplies available for large populations. Some of these were discussed in FOOD INDUSTRIES, May, 1936 (pages 223, 224, 225, 226.)

Let us hope that 1937 floods do not damage many food plants. Nevertheless, it is well to be prepared. The experiences described on this and the following two pages came out of last year's flood and show how one plant provided an emergency power supply and how a group of New England plants reconditioned electrical equipment that had been damaged by flood waters.

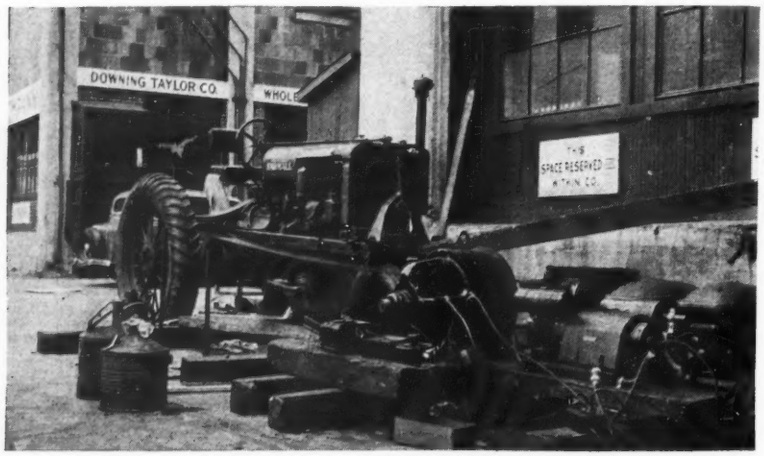
Emergency Power Supply

On Wednesday evening, March 18, 1936, the water in the Connecticut River had climbed to flood stage. While it was still rising, it was generally conceded that it would not reach the point that it had achieved in 1927, when it reached a height of 22 ft. 8 in. However, because of heavy warm rains, the following Thursday the water had risen to 25 ft. in height by evening and was still gaining.

I had been informed of the tremendous effort being made by the United Electric Light Company employees in trying to keep the water from reaching their boiler room. As a precaution, in case our electric power supply should be cut off, I called up various dealers in town who might have diesel or gas engines that could be belted direct to our compressors. But it developed that the dealers' establishments were all inundated.

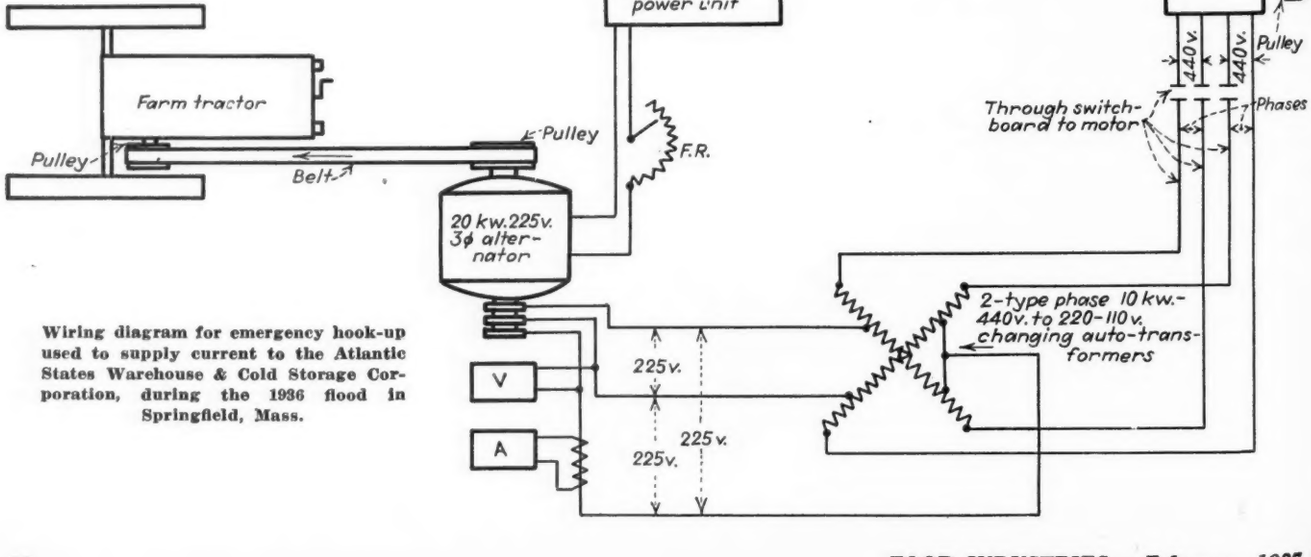
I then called a friend of mine who, I knew, had a gasoline tractor with a power take-off. Through him I was able to procure two of these tractors. These were belted to generators borrowed from the Westinghouse service station.

The generators were of 20 kw. capacity, producing three-phase 220-volt current. As we operate on three wire, two phase, 440 volts, it was necessary to transform this current. We procured two Type S phase changing auto transformers. These were each 10 kw., 440-220-110 volt. Using them to the best advantage, we were able to get an unbalanced, two-phase four-wire 440-volt



Here is one of the farm tractors, together with generator and auxiliaries, that helped tide a cold storage plant over a flood emergency.

The Plant NOTEBOOK



Wiring diagram for emergency hook-up used to supply current to the Atlantic States Warehouse & Cold Storage Corporation, during the 1936 flood in Springfield, Mass.

circuit. This was used by running the four wires direct to our 9x9 Frick compressor motor.

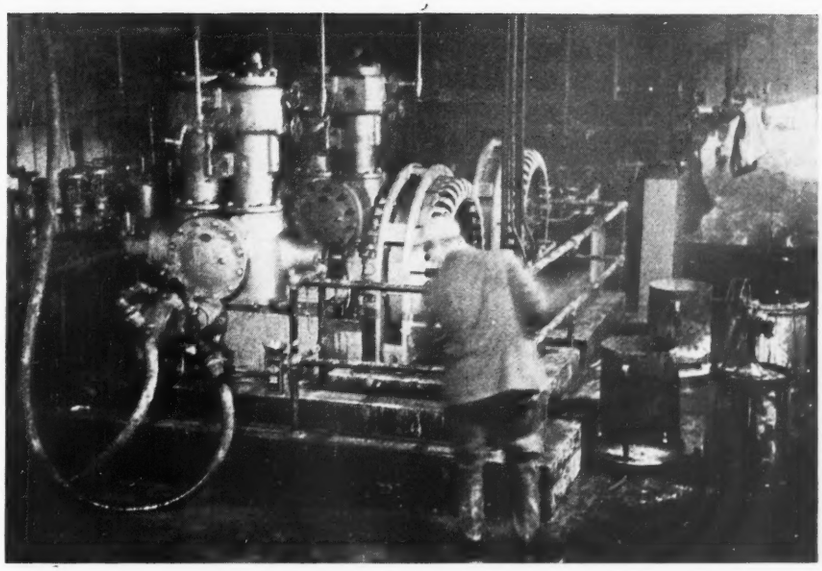
We now needed only an exciter for our generator, to complete the set. To this end, we rented a 1 kw. Westinghouse gas engine driven 110 volt d.c. power unit. This was wired through a field rheostat to the field coils of the 440 volt generator. The hook-up is shown in the accompanying wiring diagram. It is also shown in the photograph.

The other generator was belted to a tractor and exciter. It was used for 220 volt electric oven heaters used for manufacturing purposes.

To make a long story shorter, the United Electric Light Company's power went off at 1:26 a.m. on Friday, March 20. We had our first emergency hook-up running by 9 a.m. that same morning and the second running by 11 p.m. on Friday night.

These emergency hook-ups were kept running continuously until Monday, March 23, when at 8 p.m. the public utility power was again available. During the whole period of emergency operation our engineers, by ingenious juggling of liquid and expansion valves, were able to maintain temperatures and preserve the merchandise entrusted to our care.

Ours was the only cold storage plant operating in Springfield during this time. This was in large measure because of the fine spirit of cooperation existing between our company and its tenants and customers. Through them it was possible to get the necessary units for this makeshift power plant. Prime movers and generators were very scarce in Springfield, and I was offered some rather fancy prices for our contraptions. All of which proves: in emergencies, get your order in early.—MARTIN LARSEN, *General Manager, Atlantic States Warehouse & Cold Storage Corporation, Springfield, Mass.*



The engine room of one New England plant looked like this after the 1936 flood.

Reconditioning Flooded Electrical Equipment

What should be done to salvage electrical apparatus in a food plant after flooding? Experience in past inundations proved a valuable guide to rehabilitation in the floods of March, 1936. Quite a body of practical procedure has been assembled for the benefit of industry by electrical manufacturers, public utilities, insurance companies, maintenance organizations and engineers. Basically the problem is one of complete cleaning, drying, testing and care not to restore equipment to service until its condition warrants such action, no matter how urgent the pressure upon production facilities.

Where it is possible to retain the services of reputable electrical maintenance organizations to advise whether equipment should be reconditioned or replaced wholly or in part, the food plant can generally count upon good results. Rehabilitation is an everyday matter with these concerns and emergencies are their breath of life.

In many cases, however, it is necessary to rely upon "home talent" in dealing with inundated apparatus, and for the benefit of plant operators who must depend on themselves at least for a time in trying to get things going the following notes are given.

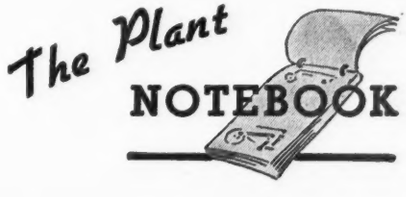
Putting Electric Motors in Shape

As soon as the water has subsided and the debris has been removed all motors which have been submerged should first be thoroughly cleaned of dirt, oil and grease. This can be done by washing with a stream of clean water, but extreme care should be exercised to use low-pressure water as the abrasive action of dirt or sand combined with a powerful stream can easily damage the insulation. When cleaning exposed conductors or stators and rotors of disassembled machines, a gentle stream of water and wiping with a cloth or gently scrubbing with a fiber brush are effective. Small motors should be removed to the plant repair shop or to a commercial maintenance shop where they can be given proper attention.

Ventilating ducts should be freed of obstructions. Bearings must be emptied and cleaned. Grease, sticky dirt, and oil can be removed by gasoline or carbon tetrachloride under proper ventilation conditions. It is an excellent precaution to remove fumes through an ordinary stovepipe fitted with a blower. If time permits after drying, windings may be cleaned with "Atlantic Safety Clean" or carbon tetrachloride and then painted with "Glyptal" or other approved air drying varnish.

Direct current motors and generators require special treatment as the field coils require longer baking at higher temperatures than do alternators. The armatures of d.c. machines should be removed from the bearings and suspended in various positions to drain the water from the internal cavities, particularly the commutator. In some cases it is necessary to remove the end flange of the commutator entirely to get rid of the water. Operating coils and motors of rheostats, circuit breakers and contactors should be cleaned and placed in a drying oven.

The cleaning solution may be applied with a brush, cloth or spray gun. In removing stubborn particles violent scraping is undesirable as cleaning solutions may have a solvent action upon the binding compounds in the insulation. Gasoline is less injurious in this respect than carbon tetrachloride. Spraying apparatus ought to be grounded as well as the metal parts of machines undergoing rehabilitation, to guard against static sparks and explosions. Dry compressed air, heated where feasible, is a valuable aid in cleaning.



Points on Drying Motors

Motor drying can be accomplished either by passing electricity through the windings or by placing the motor or parts in a heated inclosure of canvas, building paper, "Celotex" or similar material. The inclosure must be ven-

tilated to allow the moisture to escape. The source of heat can be steam pipes, electric heating units, improvised resistance units or ovens in which equipment can be placed for treatment. Where direct heating is employed, great care should be taken to avoid mixing the products of combustion with the drying air. In some cases gasoline torches have been used by directing the flame through a screened tube or pipe to catch sparks and soot; but this method is dangerous and should be avoided if any other source of heat is available. Charcoal buckets provide uniform heat when properly spaced. Sometimes portable generating sets driven by gasoline engines can be rounded up for supplying low-voltage current for internal heating, the exhaust being used for external heating by piping it into a drum to free it from soot and noxious gases.

The temperature of the drying air should not exceed 200 deg. F., and it is best to filter or baffle the air before passing it to the machine. Deflectors may be used to promote proper distribution of air and insure uniform drying. Where an oven is available, small equipment can be dried by placing it inside and controlling the temperature so that it does not exceed 200 deg. F.

In typical cases it has been necessary to wash motors for 1 or 2 hours to remove silt and other foreign matter, followed by oven heating for 8 to 24 hours according to the conditions and size of motor. One large maintenance house washes the coils in naphtha to remove residue oil and grease after the first baking and then bakes again for 8 to 48 hours, after which another naphtha washing follows if oil still bubbles out of the insulation. They then dip the motor in insulating varnish, baking again 8 to 14 hours, after which the air gap and frame are scraped clean and the windings given a finishing coat of insulating varnish. The insulation

The Plant NOTEBOOK

of the windings is tested by megger at each stage. Alternating current motors are tested to ground from windings at double rated voltage plus 1,000. Direct current motors are tested at 1,000 volts from winding to ground. Field coils are tested for current and voltage drop. Direct current armatures are given an audible or so-called "growler" test and also a millivolts drop to ground test. End bells and bearing chambers are cleaned by inserting them from 30 minutes to 3 hours in an electrolyte tank at about 135 deg. F.

Miscellaneous Controls and Apparatus

Insulators should be made clean and dry, and in reconditioning panel wiring, dry heated or compressed air is useful. Electric hair dryers of the beauty parlor type proved valuable in the recent flood work, in this connection. Small relay coils, solenoids, etc., which have been submerged for a long time should probably be replaced. In some cases satisfactory results come from disassembly and drying in ovens. Devices having contacts obviously must be disassembled and cleaned before putting them back in use.

In the case of oil circuit breakers, if water has entered the tanks the oil must be filtered and replaced with new oil. Transformer covers should be off to allow water vapor to escape, a filter press being used to recondition the oil. On small transformers the core and coils can be removed and dried in an oven or improvised heated inclosure. Tanks should be thoroughly dried out. Elaborate instructions as to reconditioning power transformers have been issued by the General Electric Company, but such units are within the public utility category, in the main.

Compensators are classed among the smaller apparatus and in most cases can readily be removed for drying in ovens or heated enclosures. If equipped with an oil switch the oil should be removed and extraneous dirt and water wiped from the transformer windings. If the factory finish on the windings has been injured it should be repaired by dipping in insulating varnish and baking after drying is done. All contact points should be cleaned and brightened. Approximately full load current can be passed through transformer windings by applying reduced voltage to one winding and short-circuiting the other. In circuit breakers, press-board liners, barriers or any other porous material should be replaced with new material if possible. But if time prevents, the material can be oven-dried.

Rotary converters and direct current generators can be dried by operating on short circuit with separately excited shunt field winding. Rotaries can also be dried by low voltage, usually available from taps on the machine transformers applied to the collector rings with the armature blocked. To prevent dangerous voltages being set up in the shunt field coils, these should be short-circuited. If it is necessary to disassemble the field coils, they can be best dried by the use of the hot air method. The following figures indicate the required insulation resistance readings that should be obtained before safely operating the machine:

Rating Kva.	Hours Between Readings	No. of Consecutive Readings Which Should be Nearly Constant	Readings in Megohms
1 to 50	2	4	3
50 to 200	3	5	5
200 to 2000	3	6	7

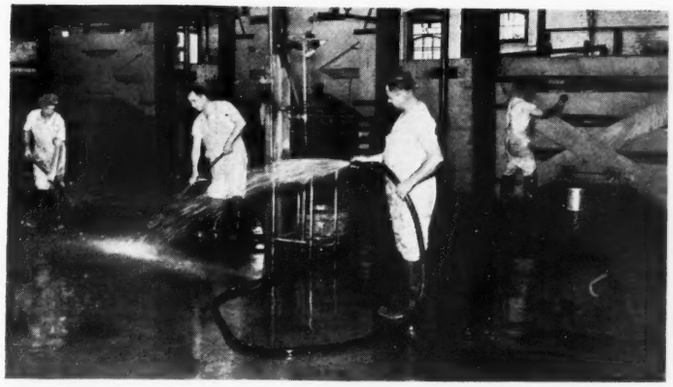
When drying is wholly or partly by the heat produced from current flowing in the windings, care must be taken to increase the current at such a rate as will insure against overheating. From 4 to 8 hours should be taken gradually to bring the temperature of the winding to the drying temperature.

The megger test has been found satisfactory in checking up the presence of moisture in motors and generators. Approximate values used are: (1) Not less than 1 megohm for low-voltage apparatus; (2) 1 megohm per 1,000 volts for apparatus of higher potential; (3) on cables, the reading should be not less than 10,000 ohms.

Electric fans and charcoal burners or "salamanders" are some of the means used to dry out electrical equipment damaged by flood.

Acknowledgment is given to the General Electric, Westinghouse Electrical Installation (Cambridge) and Travelers Insurance Companies for much of the above material.
—H. S. KNOWLTON, *Boston, Mass.*

HOUSEKEEPING . . .



Who Shall do it?

IN YOUR PLANT who has the responsibility of keeping the production area clean? Do you have a plant janitor force, or a special production area cleaning force? Or do you depend upon the department foremen or foreladies to keep each area cleaned up?

Uses Combination of All Three Methods

Plant cleanup is the kind of work that is hard to standardize because it must be approached from different angles depending upon the size of the plant, the kind of work performed in the plant, and the usage made by the various departments.

Where possible and practical, we clean all departments with a night gang working under a contract of so much per day and under the supervision of a foreman. This foreman interchanges men between the departments continually. The size of the gang is set up after considerable time-studies are made. For departments, such as the killing and cutting floors where we kill cattle, hogs, sheep and calves and cut hogs, this practice has worked out very satisfactorily.

Some departments clean up with their regular gangs after operations are through for the day. In all cases, with the exception of the night cleanup gang, the responsibility for proper cleanup and economical cleanup is on the departmental foreman.

In a large plant such as our Chicago plant, we do not have a plant janitor force. Each department has it's own janitor force coming directly under the department foreman. However, in our smaller plants in the West we do have all of our plant janitor forces organized, usually under the Chief of Police or the Fire Chief.

In a small industry or a small plant, we feel that a plant janitor force would work out more satisfactorily, at less cost, than when the cleanup is directly under the supervision of each department foreman.—M. D. HARDING, *Armour & Co., Chicago, Ill.*

This is Your Page

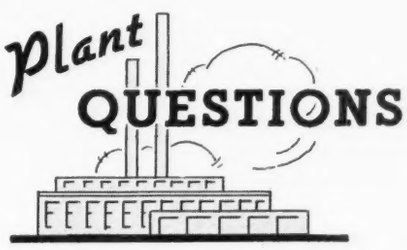
Questions answered on this page are based on actual inquiries made by readers who want to learn how others handle a troublesome plant problem.

Your participation in this exchange of experiences and ideas is cordially welcomed. What you do may be "old stuff" to you but new to the other fellow. Let us pass along your solution.

Also you may be wrestling with a problem which is "old stuff" to some one else. Why not give them a chance to help you?

Places Responsibility on Department Foreman

We believe that the cleanup activities in the flour mill are the responsibility of the foreman of the department. It is the foreman or department supervisor who can best educate the janitor and clean-up men along the lines of systematizing and simplifying the ever-present problem of keeping the plant clean. It is the foreman who should see that repairs are made on machines having improper dust suction or which work unnecessarily against clean-up activities.



Plant cleanliness is closely associated with a state of mind of the foreman and his men. In new plants of modern construction the habit of keeping the plant clean is easy to establish while in older plants much more effort is required.—CLAUDE F. DAVIS, *The Western Star Mill Co., Salina, Kan.*

Each Worker Held Responsible

If those employees who make the dirt have to clean it up they will not make so much dirt. Each man or group should clean the machines, utensils and floor he uses.—E. F. DAVIDSON, *Davidson Baking Co., Portland, Ore.*

Cleaning Is Part of Production Work

Our main cleaning problems are those of production rather than mere housecleaning. Consequently they are taken care of by whomever happens to be on duty on that particular job, whether it be cleaning of malting drums or scrubbing of filter cloths. We usually have one or two free days a week when we can take care of general housecleaning. —EARL D. STEWART, *Consumer's Yeast, Oakland, Calif.*

Next Month's Question:

Surfaces of fabric packing belts, wooden tables and wooden or concrete floors are likely sources of bacterial and mold contamination of foods; especially in the summertime.

Is replacing them with rubber, metal, or tile surfaces the only solution to the problem?

If you depend upon thorough washing and scrubbing what type of sterilizing materials do you find most effective?

New DISCOVERIES AND INVENTIONS

FATS AND OILS

Refining Fats Electrically

OILS AND FATS which are not commercially acceptable as edible products because of objectionable color, odor or taste can be bleached, deodorized and given a bland flavor by an electrical treatment in milk. If the fat is sour or rancid, a mildly alkaline substance may be added to the milk to overcome acidity. The process is an Austrian invention (Austrian Patent 146,506, granted July 10, 1936 to "Elact" Gesellschaft für elektrische Apparate, Vienna).

The fat is emulsified in the milk by any suitable method, such as forcing it through a very fine sieve directly into the milk, in which two platinum electrodes (finely perforated thin sheet platinum or a screen of fine platinum wire) spaced about an inch apart are then immersed. An electric current, at relatively high voltage and relatively low current density (about 10 to 50 volts and about 60 to 150 milliamperes per sq.in. of electrode surface), is passed through the emulsion until the quality of the fat is improved in the desired manner. Depending on the food product in which the fat is to be incorporated, it may be used in the milk emulsion or the refined fat may be separated from the milk for further processing.

Neutralizing Oils and Fats

OILS which have a high content of free fatty acids and a more or less dark color can be bleached, deodorized and deprived of nearly all their free fatty acid by a single treatment. This is accomplished by stirring zinc dust into the hot oil. Temperatures above 300 deg. F. are employed. An example which is described in German Patent 634,043 (granted Aug. 14, 1936, to Gunther Adam) is the simultaneous bleaching, deacidification and deodorization of reddish brown palm oil by stirring 10 parts by weight of zinc dust in 500 parts by weight of the crude palm oil for an hour at about 445 deg. F.

The treated oil is colorless and contains only 1.5 per cent free fatty acids. As it cools to about the boiling point of water a zinc soap is precipitated. When separated from the oil this soap can be used for making zinc oxide. The hydrogen gas, which is liberated during the process, deodorizes the oil. The hydrogen also can be recovered as a byproduct.

DAIRY PRODUCTS

Automatic Process Control In Powdered Milk Manufacture

HOW TO HOOK UP an automatic control of a one-man Douthitt (Grey-Jensen) spray drier working on milk is described. Very accurate control of temperature of milk at 161 deg. F. in the heater just ahead of the concentrator is essential for, if the temperature runs up, the equipment will clog. And this will require shutdowns of several hours to clean it out. The problem is not easy because of the variation of the inflow of milk to this heater. Part of it is recirculated partially concentrated milk below 170 deg. F. and part of it is unconcentrated milk at 70 deg. F. The relative amounts are governed by a float valve.

The hook-up depends on the thermal element in the outlet of this particular heater operating the steam inlet valve through an instrument located on a lower floor where the operator can keep an eye on it while also barreling the finished product. A flow diagram is given.

Digested from "An Automatic Process in Powdered Milk Manufacture," by G. P. Lonergan, *Industrial and Engineering Chemistry*, 28, 1264, 1936.

Easier Way to Clean Equipment

RINSE THE PARTS with clean tap water. Do not scrub, wash or steam them. Then submerge them in a special solution until ready to use again. At that time, you rinse the parts with clean water and assemble the equipment. This method is proposed for cleaning dairy equipment which needs more cleaning than any other equipment used in food processing. It is satisfactory for separators, milking machines and homogenizers. The latter are merely filled with the solution after rinsing and then left with valves closed.

The solution is made in the following proportions:

Trisodium phosphate	100 lb.
Sodium chromate	5 lb.
Water	2,000 lb.

Digest from "Cleaning Dairy Equipment With Trisodium Phosphate" by L. A. Rogers and Fred R. Evans (U. S. Department of Agriculture). *Journal of Dairy Science*, 19, 733, 1936.

Products From Skim Milk and Whey

THE DAIRY INDUSTRY, like the packing industry, has many opportunities for byproduct utilization. In addition to ordinary milk powder, spray drying of the protein emulsion from apple pectin and skim milk gives a milk powder which has numerous specialty uses in confectionery or fine baking and as a substitute for fresh protein. Whey is not efficient for feeding farm animals, and concentration by evaporation is generally unprofitable unless it can be done on a very large scale. The answer to this problem, as developed by Chemische Werke vormals H. & E. Albert A.-G. in Wiesbaden, is concentration by precipitation. The whey is heated to about 160 deg. F and a reagent is added which precipitates both the mineral salts and the proteins. No elaborate or expensive equipment is needed for this process and the precipitated product is a useful stock feed.

The precipitation process allows the milk sugar in the whey to be lost. Depending on circumstances, there may be more profit in recovering the milk sugar instead of the proteins. In that case, the whey is heated to about 195 deg. F. to coagulate the protein, and the clear solution thus obtained is evaporated to crystallize the crude milk sugar. The coagulated protein can be used for stock feed, or refined and used in foods and in certain pharmaceuticals.

Whey as a source of lactic acid has to compete with starchy materials, which are also very cheap. But the increasing ease and economy of rural transportation, facilitating central station collection of whey from scattered small producers, may enable whey to meet this competition successfully.

Digest from "New Products From Skim Milk and Whey," by L. Eberlein, *Chemiker-Zeitung*, 60, 825, 1936.

FRESH FISH

Preserving Fresh Fish With Ozone

A NEW PROCESS for preserving fresh fish is particularly useful for fishing vessels wishing to remain at sea one or two weeks before taking the catch to port. The freshly caught fish are washed with sterilized sea water and packed in sterile ice at a temperature approximating 32 deg. F. An important feature of the process is that sea water can be successfully sterilized with ozone, presenting no more difficulty than does fresh water. Interference from iodine compounds might be expected, but actually does not occur because organic iodine compounds are not decomposed by ozone under the sterilization conditions, and surface sea water never contains any inorganic iodides.

Unlike most other sterilizing agents, ozone can be used in excess without leaving any added reagent in the water. The excess decomposes in a few minutes, leaving only a little dissolved oxygen which has no perceptible effect. The fish preserved by this method arrive in port in very satisfactory condition. The method is adaptable and each fishing vessel, with its ozonizing and refrigerating equipment, can select operating conditions which best suit its particular circumstances.

Digest from 'Use of Ozone for Maintaining Freshness and Prolonging Keeping Time of Fish," by J. Salmon and J. Le Gall, *Annales d'Hygiene Publique*, 14, No. 2, 84. 1936.

JAMS AND JELLIES

Cooking Pears and Apples

THE HYDROLYSIS of protopectin and hemicelluloses is an important factor in cooking pears and apples, especially in making jam. Pears were cooked in water and in syrups containing 10 to 65 per cent sugar. Hydrolysis was greatest in pure water, decreasing as the sugar concentration increased. The same is true of the extent to which the pears were disintegrated by boiling. Acidity is an important factor in hydrolysis; protopectin hydrolysis is at a minimum in pears when their pH= 4.3 to 4.9, but in apples the minimum occurs at a lower acidity, i.e., at a higher pH value, namely pH=5.1. Green apples disintegrate more easily in boiling water than do ripe apples.

Apparently ripening changes the character of the protopectin. Disintegration is lessened by adjusting the acidity to the pH at which minimum hydrolysis occurs, but this expedient cannot be employed for green apples because they do not show any such minimum. Plums behave like apples. The hydrolytic effect of organic acids depends on the acidity which they impart to the hot liquid. The sodium or ammonium salts of the organic acids hydrolyze protopectin more actively than does the free acid, but the acids are more active than their salts in hydrolyzing hemicelluloses.

Digest from "Hydrolysis of Protopectin and Hemicelluloses in Fruits by Heating," by N. V. Saburov, E. N. Dudkina and L. V. Kaperina, *Konservnaya Promyshlennost*, 1936, No. 3, p. 20.

BAKERY PRODUCTS

Delayed Leavening With Peroxides

TO ADAPT the peroxide leavening process to baked products made from a batter which may stand for some time but is then baked quickly (for example waffles and griddle cakes), the peroxide decomposition is inhibited while the batter is waiting to be used. The invention by which this is accomplished without losing the leavening effect is described in British Patent 451,118 (granted to Imperial Chemical Industries, Ltd., Oct. 22, 1936). Sufficient baking soda or sodium phosphate is added to the batter to bring its alkalinity into the pH range from 8 to 10. (A system having any pH value above 7 is alkaline). Too much soda must be avoided because the baked product has a disagreeable taste if the pH of the batter was higher than 10, say from 10 to 13.

The function of the alkalinity imparted by soda or phosphate is to inhibit the peroxide decomposition in the cold batter but *not* when it is at the baking temperature. The temperature sensitivity of the batter prepared according to this invention is such that the peroxide decomposes, thereby imparting its full leavening effect, before the highest baking temperature is reached. Because waffles and griddle cakes are baked quickly, the time available for the reaction is short, but good results are obtained. The patent specification also gives recipes for using the invention in making doughnuts.

New Way to Make Light Crackers

CRACKERS of unusually light, porous texture can be made by cutting the dough in threads and laying the threads in layers, each layer crosswise to the layer below it. This is accomplished by passing the dough between two rolls, one smooth and the other scored around its circumference with fine, closely spaced grooves. The layers are deposited on a conveyor belt, the direction of the threads being changed with each new layer. A sheet of about eight layers is stamped or cut under just sufficient pressure to join the layers without packing them tightly together. The greater pressure at the margins compacts the edges of each cracker but leaves the remainder light and fluffy. The invention (British Patent 440,790, application date July 5, 1935) is assigned to Loose-Wiles Biscuit Co.

MISCELLANEOUS FOODS

Treatment for Coffee and Tea

MAXIMUM yield in the percolator or tea pot is claimed for coffee or tea treated by a new process developed in Germany. And the best flavor and aroma is said to be brought out.

As applied to coffee, the treatment involves heating the roasted and ground product gently to about 105-125 deg. F. and wetting with as much water as the coffee will take up without becoming conspicuously wet. Then the coffee is heated for several hours at a temperature well below the boiling point of water (not more than about 175 deg. F.) but well above body temperature (say about 120 deg. F., or somewhat higher.) The customary procedure for making a beverage may then be followed with excellent results.

Digested from D. R. Patent 620, 612.

Baker's Yeast

THE AERATION PROCESS for making baker's yeast cultures was tested by carrying out fermentations in sets of ten under varied but controlled conditions. The ten fermentations in each set were used to study the progress of the culture with time, the first sample being examined after 1 hour and successive samples hourly, the tenth being examined at 9.5 instead of 10 hours. In this process a mash of brewer's wort and molasses is used, with ammonium sulphate and diammonium phosphate as nutrient salts. For the first hour only a small portion of the mash is used, with slow aeration (300 liters air per hour). This is followed by stepwise addition of the remainder of the mash and the nutrient salts over a period of 6 hours, with full aeration (600 liters air per hour) and gradual temperature rise from 77 to 86 deg. F. When all the mash is in, the full aeration is continued 30 minutes and followed by

2 hours of slow aeration. Thus the total time is 9.5 hours.

The tests showed that the yeast reaches its top quality, as judged by fermenting time in dough, at 8.5 hours. During the last hour the quantity of yeast increases at the expense of quality. Keeping qualities depend more on the washing of the yeast than on the stage of maturity. The fermentation was found to proceed in four stages: (1) the preliminary fermentation, first hour, with no budding; (2) very active budding, second to fourth hour; (3) even rate of budding, fourth to seventh hour; (4) ripening stages, but later is used up in cell growth and, in the last stages, the alcohol is consumed faster than it is formed.

Digest from "Experiments in Making Baker's Yeast Cultures by the Aeration Method," by W. Braun and R. Pfundt, *Biochemische Zeitschrift*, 287, 115. 1936.

Stable Baking Powder

IN U. S. PATENT NO. 2,062,039 is defined a baking powder mixture which is reactive for the liberation of CO_2 only upon the application of heat in the presence of moisture.

It contains phthalic anhydride as the acid ingredient which is claimed not to impart a sour taste if accidentally used in excessive amounts. Further claims are made that the mixture is inexpensive to make, is efficient in use, and may be stored for a long period without deterioration under either dry or damp atmospheric conditions.

A representative mixture is one part by weight of sodium bicarbonate to 0.94 parts phthalic anhydride with 1.03 parts starch and 1.03 parts flour as inert fillers.

The patent was granted Nov. 24, 1936, to Harry B. Rathbun of Waterbury, Conn.

SUGAR

Java Uses Brass Tubes For Sugar Evaporators

TAUGHT BY EXPERIENCE, sugar refineries in Java use no metal but brass for preheaters and evaporators. The industry has in use about 3,000 tons of brass tubes. Calculated on an average service life of about fifteen years, Java requires some 180 to 200 tons of new brass tubing annually. For evaporators the most durable brass has the composition copper, 70; zinc, 30. Muntz metal (copper, 60; zinc, 40) is less resistant to corrosion but is superior in resistance to erosion. The principal causes of erosion (mechanical wearing away) are improper use of devices for cleaning out scale from the tubes, incorrect mounting of preheater tubes, and high speed liquid flow in preheaters.

A cause of tube wear which is sometimes very serious is pumping aerated juice. The resulting attack on the tubes is probably a combination of mechanical and chemical action, i.e., of erosion and corrosion. The principal causes of corrosion are contact with vapors containing sulphur dioxide or carbon dioxide, fermentation in the juice with liberation of hydrogen sulphide gas (which is highly corrosive to brass), and contamination of liquids with ferric oxide. Iron steam pipes and boilers sometimes give off sufficient ferric oxide to cause serious loss of zinc from the brass preheater and evaporator tubes.

Not only the chemical composition but also the crystalline texture of brass must be properly adapted to the service conditions encountered in the sugar refineries. The heat treatment must be carefully controlled to give a crystal size which is neither very coarse nor very fine. Tubes which meet the specifications based on actual refinery experience generally give good service.

Digest from "Brass Tubes in the Java Cane Sugar Industry," by P. Honig, *Korrosion und Metallschutz*, 12, 310. 1936.

BEVERAGES

"Curing" Off-Flavored Beer

CHARCOAL and activated carbons have long been used for the removal of undesired flavors, colors and odors from various liquid foods. But, until recently, removal of bacterial tastes and odors from beer and ale has not been among their accomplishments because they were equally effective in removing the desired flavors and odors.

U.S. Patent No. 2,062,075 granted Nov. 24, 1936, to Leo Wallerstein, New York, N.Y., describes how they may be used with selective action. The flavors and odors removed are those produced during the growth and propagation of sarcina, obnoxious bacteria commonly regarded as being pathogenically harmless.

The selective action is obtained through using charcoal activated by treating with superheated steam or made by charring wood in presence of zinc chloride or some such activating substance and having an absorbing strength sufficient for 1 gram to decolorize 500 to 600 c.c. of a 1 to 4,000 solution of methylene blue. Preferred conditions for the use of the charcoal are: (1) in a fermented wort having a controlled pH range between 4.0 and 5.0 (2) in quantities not to exceed 10 oz. per 31 gal. barrel of wort, (3) at temperatures ranging from 0 to 15 deg. C. and (4) for a time period not to exceed 30 min. Satisfactory results may be obtained by using only ½ to 5 oz. per 31 gal. barrel and in a time period of 5 to 10 min. The charcoal may be mixed with some porous inert material such as kieselguhr.

Filtration or decantation may be used to clarify the beer or ale after the fermented wort has been given the activated charcoal treatment.

GENERAL

How to Make Solidified Liquid Extracts

THE ANHYDRIDES of certain sugars have been found to be useful solid ingredients for making solid preparations from liquid extracts. Tea or coffee concentrates, fruit juices, blood, yoghurt, bacterial cultures and yeast preparations are among the liquid products which can be successfully solidified by this means. As disclosed in French Patent 800,324 (granted July 2, 1936 to Alois Kroulik, with priority in Czechoslovakia as of May 9, 1934), anhydrolactose (the anhydride of milk sugar) is one of the best materials for the purpose. After mixing sufficient of the sugar anhydride with the liquid to give a solid preparation, the product is made up in the desired form for sale or use. The relative proportions of solid and liquid depend on the particular extract or concentrate to be solidified. A convenient form for the final product is in cubes. If needful to avoid loss of aroma, the cubes may be glazed with sugar or with agar-agar.

What Athletes Should Eat

THERE is a sound scientific basis for the use of candy and other sweets as a fatigue diet. And the refreshing effect is especially rapid with sweetened fruit juices, malt preparations, glucose products and zwieback. But popular opinion, correct thus far, errs in attaching too much importance to fats, such as butter, cream, bacon and the like. Fats in excess of a moderate ration cause athletes to tire easily.

These are some of the general dietary truths discovered by a German who took advantage of the Olympic games to study the problems of eating for those who engage in strenuous sports. This work revealed that the diet must be physiologically and hygienically adequate, sound and balanced.

These studies also showed that salt should be used sparingly — small amounts of spices will give the needed condiment effects. Yeast and sprouted grain are useful for their protein and vitamin contents. But the main sources of proteins should be dairy products, eggs and fish, with only moderate use of meat. Fruits and vegetables should provide the main supply of vitamins and minerals.

Digested from "Diet and Training Rules for Athletes," by Max Winckel. *Chemiker-Zeitung* 60, 644, 1936. (Published in Germany.)

What's New IN EQUIPMENT

Plate Heat Exchanger

A NEW DESIGN of milk-to-milk heat exchanger for dairies is now being installed by York Ice Machinery Corp. Called Model DHS, double pedestal unit, it operates on a milk-to-milk regeneration and final heating cycle.

One unit has been put in service. It is handling 10,000 lb. of milk per hour, one section operating with hot water to heat the milk to a final temperature of 145 deg. F. for its 30 minute pasteurization period in an insulated holding tank. The other section operates to heat raw milk from 40 to 120 deg. F. for entrance into heating section, and for cooling pasteurized milk from 145 to 65 deg. F. before it goes to the refrigerated cooler.

Fluid flow is in a broad, shallow film, over the entire surface of the plates. This gives relatively slow flow, with high heat transfer.

The apparatus is made up of an assembly of smooth, die-pressed, stainless steel plates, grooved to form passages on each side. These plates are carried in a frame, with movable heads for easy disassembly and cleaning.

An addition to heat exchanging this equipment can be used for cooling with either water or brine, or for high temperature—short time pasteurization. Capacity can be varied by increasing or decreasing the number of plates used.

Precision Weighing Device

EXACT WEIGHT SCALE CO., Columbus, Ohio, has developed a new precision weighing device called the "Shadowgraph." This is an overweight and underweight scale designed to eliminate all indicating mechanism, thereby reducing working parts by 30 per cent. For the indicating machine, the scale substitutes a shadow on a dial, avoiding parallax readings.

Advantages claimed are more accurate readings with strict tolerances; high speed of weighing; accurate weighing in out-of-level positions; rubber mountings to eliminate noise; easy portability; and completely housed parts.

This scale is available in 5 lb. or 2,500 gm. capacities. Its dimensions are $16\frac{1}{2}$ in. long, 9 in. wide, and $11\frac{3}{4}$ in. high.

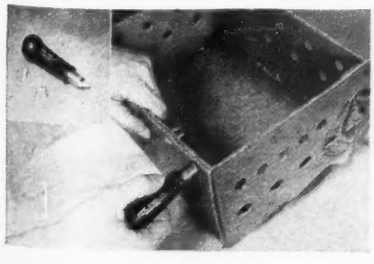
Stapling Tool

A POCKET-SIZE TOOL for applying Acme paper box staples to corrugated boxes is being distributed by Acme Steel Co., 2832 Archer Ave., Chicago, Ill. It utilizes spring action to drive the staple through several thicknesses of corrugated board. Handle is of Bakelite.

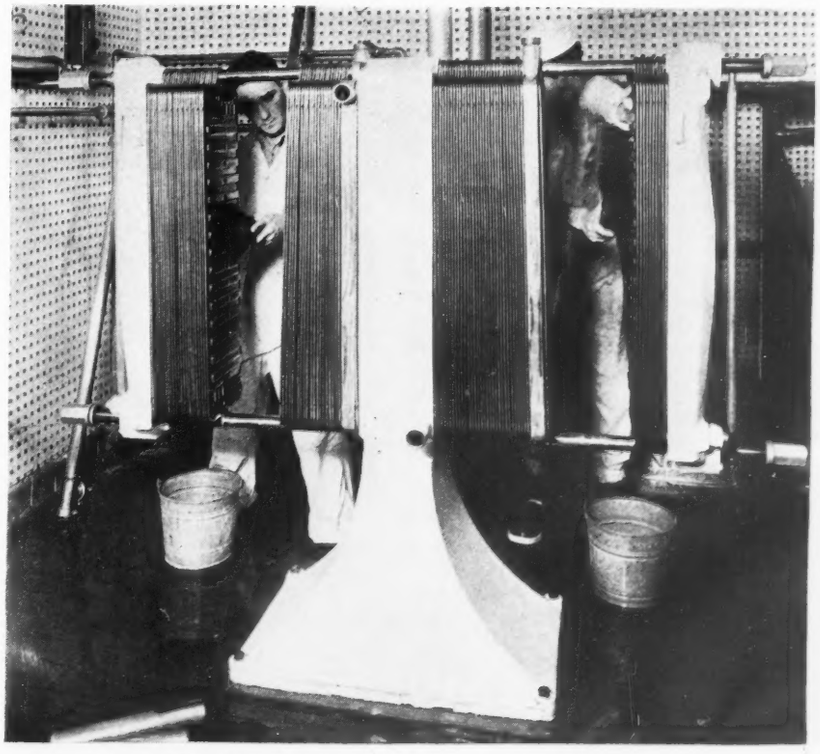
Safety Bread Slicer

A NEW SMALL BREAD SLICER for the retail baker has been developed by Oliver Machinery Co., Grand Rapids, Mich. It is called the "Safety-Slicer" and is designed to slice one loaf at a time. Capacity is for loaves up to 16 in. long. The motor is $\frac{1}{4}$ hp. Special switch starting and stopping mechanism are provided. The machine is of steel, is trimmed with nickeled bands, and can be supplied in any color finish that may be desired.

Safety bread slicer for retail stores



Stapling tool



View of cleaning operation on York heat exchanger for dairies

Safety devices are provided so that children or others tampering with the machine, cannot injure themselves.

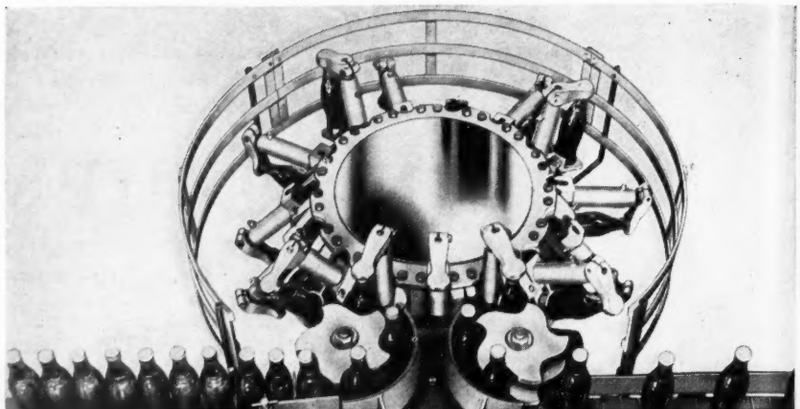
Beverage Mixer

ASSURANCE of thoroughly mixed, uniform beverages is said to be given to bottlers through the use of the "Red Diamond" beverage mixer recently introduced by Liquid Carbonic Corp., 3100 So. Kedzie Ave., Chicago, Ill.

As can be seen from the illustration, the mixer is set into the conveyor line after the crowning machine. A timing latch spaces the bottles at regular intervals. A five pocket revolving feeder star feeds the bottles to the mixer. This is equipped with an automatic safety gate which stops the machine instantly if a jam occurs.

As the bottle enters the mixer it enters a holder. During the course of one revolution of the mixer head, the bottle receives three complete mixing movements in which it is tilted from an angle of 15 deg. to the vertical to an angle of 55 deg. below the horizontal. Each change of position is followed by a "mixing pause." Bottles are then returned to the conveyor by a discharge star.

Power is supplied by a ¾ hp. motor. Two sizes are available, one accommodating standard size 8 in. high splits; the other all sizes from a split to a 32 oz. size.



Beverage mixer

Precooler

FOR COLD ROOMS, and for precooling refrigerator cars, Precooling Equipment Corp., 130 No. Wells St., Chicago, Ill., have developed a new precooler. It is of 6-ton capacity, is motor operated, and is mounted on rubber tired ball bearing wheels for easy portability. Its use is claimed to save 30 to 40 per cent on the refrigerant, as compared to ice and salt, and from 60 to 70 per cent of precooling time, with a much smaller labor requirement.

Photoelectric Control Cell

FOR COUNTING, SORTING, WEIGHING, process control, safety warning, cut-offs, and similar operations, Weston Electrical Instrument Corp., Newark, N. J., have developed a new photo-electric control unit. It consists of a Weston photo-cell of high output characteristics in a protective mounting, a complete relay unit in a separate panel box, and a light source of standard design. A light intensity of 100 foot-candles falling on the cell provides adequate energy for positive operation of the relay system in contrast to the 200 foot-candles formerly required.

Output capacity of the new relay is 500 watts, so that most installations can be handled directly by the relay contacts without the use of external contactors. Part of the assembly is a microammeter calibrated in light units, to show the level of illumination reaching the photo-cell. This prevents operating difficulties resulting from failure to maintain light on the cell at an adequate level.

Vibrating Screen

FOR SCREENING FOOD INGREDIENTS, Productive Equipment Corp., 4600 South Kedzie Ave., Chicago, Ill., have recently developed an improved "Selectro" vibrating screen, in addition to its regular line of screens.

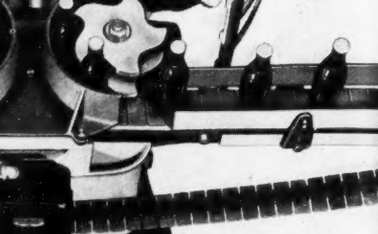
The new screens, made of stainless steel, are equipped with a selective throw. This permits the operator to adjust the stroke of the screen to suit the needs of the material being handled. There are eight positions, which may be selected as material is varied, without any lost time for shutdowns. In addition, the tilt of the screen can be adjusted, even while the device is in operation.

Bottle or Can Counter

BREWERS, carbonated beverage bottlers and others who need to check numbers of filled bottles and cans, or empty returns, will find useful a method worked out by Production Instrument Co., 1325 So. Wabash Ave., Chicago, Ill.

The system is electric. Bottle or can conveyor lines are equipped with special switches or photo-electric relay units. Either type is easily placed in such a location as to be free from deliberate or accidental interference.

As the containers being counted pass on the conveyor, the switch or relay



Bottle or can counter. At left are shown four counters with individual reset, located at the machines, while at the right are totalizing counters in the superintendent's office.

records on electric counter. These counters may be located where desired. One system, as shown in the photograph, makes use of local counters at each filling and washing machine, and a totalizing counter in the superintendent's office. Counters are enclosed in locked glass cases, permitting easy reading without the possibility of resetting except by an authorized person. Any desired arrangement of counters can be made.

Heat Indicating Paint

AS A MEANS of giving warning when temperatures become too high in processing equipment such as heating tanks, or in moving equipment such as bearings, Efkalin Co., 804 East 141st St., New York, N. Y., has developed a heat sensitive paint.

The feature of this paint is that it changes color when a definite temperature has been exceeded, but returns to its original color when allowed to cool off. Seven of these "retroactive" paints are available, with temperatures

of color change ranging from 104 to 464 deg. F., and a safety margin of 25 deg. F. They are good for 25 to 50 color changes before recoating becomes necessary.

This company also produces five permanent change paints, for temperatures ranging from 300 to 734 deg. F. These require recoating after each color change. Both paints are applied to the apparatus which they protect in the form of a small strip or band, so placed as to be readily seen by the operator.

Dust Counting Instrument

EXPLOSION HAZARDS from dusts in food plants are met with in the handling of sugar, starch, malt, grains, flour, soybeans, cocoa, and many other products. To permit determination of the dust concentration in the air of the plant, and hence of the hazard existing, Bausch & Lomb Optical Company, Rochester, N. Y., have developed a dust counter.

In this instrument, air is drawn through a moistening chamber by means of an accurately calibrated hand pump of 0.001 cu.ft. capacity. The dust particles suspended in the air are impinged on a circular glass plate within the instrument. The dust deposit is in the form of a ribbon. Twelve samples may be collected on one plate, and these may be viewed and counted at once without removal. Samples may be preserved by sealing a glass cover over the slide.

The viewing and counting apparatus consists of a built-in compound microscope of 200X magnification with a special dark field illuminating system. The special hyperplane eye piece contains a micrometer disk ruled in 30 micron squares. An extra line, ruled next to the squares, permits approximate measurement of particles for

Dust counting instrument

classification as to size. The apparatus is so calibrated that by multiplying the number of dust particles in the square fields by 100,000, the total dust count per cu.ft. is determined. Size and number of dust particles are a measure of the explosion hazard.

Centrifugal Pumps

WORTHINGTON PUMP AND MACHINERY Co., Harrison, N. J., has recently brought out two new designs of centrifugal pumps of interest in the food field.

One of these is a small type of general purpose pump. It is constructed for direct motor drive, or with pulley for belt drive. Motor sizes range from ⅓ to 3 hp. It delivers from 10 to 130 gal. per minute at heads from 10 to 100 ft. A choice of standard, all iron, and all bronze fittings is offered.

The other pump is a small centrifugal pump made of "Worthite," a nickel-chromium-molybdenum steel, for all parts of the liquid end. Corrosion resistance of other parts is obtained by using special steel coated with chlorinated rubber. The pump is designed to handle acids and alkalis and is available up to 70 ft. heads and 130 gal. per min. capacity.

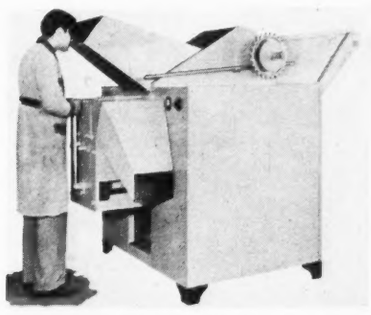
Hydrometer

AS AN AID to the food plant technologist, Taylor Instrument Companies, Rochester, N. Y., are producing a new design of hydrometer, known as the "Permax." The shape of the instrument differs from older models, and it is claimed that it will sink more rapidly to the floating point, in the liquid being tested. This design is also said to avoid air bubbles when used in viscous liquids. The hydrometer has a scale of enameled light-weight metal, which is fused into the alloy weighting material. This scale is said to withstand temperatures as high as 300 deg. F., without discoloring or loosening. The scale has been designed to increase the angle of vision three times over that of older designs.

Candy Inspection Device

THE X-RAY inspection method developed by Adrian X-Ray Manufacturing Co., 3535 No. Palmer St., Milwaukee, Wis., for canned foods, as described in FOOD INDUSTRIES, September, 1935, has been adapted to the inspection of packaged candies. Cartons or boxes passing along a conveyor move through the X-Ray Inspector. By means of the fluoroscopic principle, the operator is enabled to detect any foreign matter that may be present in any of the containers. Perfect packages automatically pass on, while by pulling a lever, the operator causes imperfect packages to be rejected at the opposite side of the machine from the regular exit.

The flouroscopic screen is green in color, restful to the operator's eyes and providing a background that shows up the outline of any stem, shell, metal, glass, wood or other foreign object. This screen is placed at a 45 deg. angle. Packages under inspection move toward the operator.

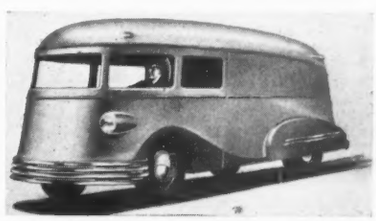


X-Ray inspection machine for boxed candy.

Delivery Truck Body

FOR RETAIL and wholesale merchandise delivery, Luce Manufacturing Co., Lansing, Mich., has developed a light truck body known as the "Merchandor." This is of the cab over engine type. The body has no hood or cowl, and full advantage is taken of the cab-over-engine design to give maximum width and length for payload space.

A feature of the new body is the one step entrance, which is already used by this company in its "Mastercraft" retail delivery bodies. Doors on either side slide toward the rear and may be locked in open position. When doors are closed, body sides are flush and steps are protected from the weather.



"Merchandor" delivery truck body

The design embodies full streamlining, and does away with separate fenders, radiator shells and many other parts. It is available for use on conventional 1½ to 2 ton chassis sizes, for use by bakers, confectioners, grocers, food distributors and similar merchandisers.

Small Boiler Feeder

A DIRECT PRESSURE BOILER FEEDER for small boilers, up to 10 hp., suitable for the small canning plant, and similar small food processing plants, has been developed by Morehead Mfg. Co., Detroit, Mich. It handles both condensate and make up water, gives a high temperature feed water, and eliminates the danger of low water. The unit is completely automatic and is said to give substantial savings in fuel, water and steam.

Just Off The Press

BOOKLETS • LITERATURE • BULLETINS

Food Plant Equipment

1. AIR CONDITIONING AND REFRIGERATION—Equipment for the air conditioning, refrigeration and heating of factories and other buildings is described in a new 16-page bulletin.

2. BAKERY EQUIPMENT — Bakery equipment including coolers, proofboxes, ovens, air conditioning apparatus, handling equipment, troughs, sifters, etc., shown in six new folders.

3. DAIRY WEIGHING EQUIPMENT—Scales for use in milk plants and creameries are illustrated and described in a new 10-page bulletin.

4. FILLING MACHINERY—Something new in filling machinery is the subject of a recent bulletin describing a conveyor net weight scale for use in filling packages of candy, nuts, macaroni products and other foods.

5. HOMOGENIZER — A two-stage homogenizer of relatively low cost, for use in dairies and other food plants, is described in a folder.

6. MATERIALS HANDLING EQUIPMENT—Hand and electric operated portable cranes for piling and handling materials in food and other plants are illustrated in a folder.

7. PROCESS CONTROL—Coordinated process control for automatic operation of all technical operations by means of control instruments is described in a new bulletin.

8. PROCESSING KETTLES—The design and use of direct-fired and jacketed processing kettles, in the food and chemical industries, are discussed and illustrated by W. M. McConnell, in a new technical bulletin.

9. PUMPS—Automatic priming for centrifugal pumps, for use when the pump is located above the level of liquid supply, is discussed in a 4-page bulletin.

10. REFRIGERATION EQUIPMENT—How to preserve perishable foods at low cost by means of air conditioning refrigeration is discussed in a new 20-page bulletin. Another bulletin issued by the same equipment manufacturer discusses the profit possibilities arising from the air conditioning of retail outlets.

Plant Accessories and Supplies

11. AIR COMPRESSORS — Feather valve compressors for the economical production of compressed air are discussed in a recent folder.

12. CONVEYOR BELTING—"Foodtex," a sanitary conveyor belting for handling fruits, vegetables, baked goods and other food products is described in an illustrated bulletin.

13. PAINT—"Luminall," a casein paint for high light reflection purposes in factories, stores and other buildings is the subject of a recent publication.

14. STOKERS—Stokers for industrial boilers in capacities up to 300 boiler horsepower form the subject of a 28-page illustrated catalog.

15. WELDING EQUIPMENT — "The New Arc Welding Technique" is a 20-page bulletin describing the design and use of portable arc welding equipment.

Packaging

16. ADHESIVES—The correct adhesive for use with bottle labelers for any product can be readily selected by means of a circular slide rule called the "Mikah-Meter."

17. MESH BAGS—Advantages of merchandising fruits and vegetables in open-mesh fabric bags are discussed in a sixteen page bulletin.

18. PACKAGING — Envelope filling and sealing for products such as nuts and candies are accomplished by equipment described in a new 4-page bulletin.

19. PACKAGING EQUIPMENT—Some well-known users of modern packaging equipment, and some of the advantages they obtain from it, are discussed in a 4-page bulletin.

20. SHIPPING TECHNICS — "The Acme Skid Idea" is a 10-page bulletin illustrating ways and means of handling and shipping containers of various sizes and shapes.

Trucks, Tractors and Accessories

21. TRUCK BRAKES—The use of electric brakes for trucks, tractors and trailers is discussed in a new folder.

22. TRUCK REFRIGERATION—"Kold-Hold" applications for the refrigeration of truck and trailer bodies handling food products are shown in a well-illustrated bulletin.

Laboratory Equipment

23. LABORATORY EQUIPMENT—Laboratory instruments and accessory equipment are shown in a new general catalog.

24. LABORATORY EQUIPMENT—"Know Your Pack" describes microscopic equipment and accessories for the canner's laboratory.

25. LABORATORY EQUIPMENT—Electric heaters, gas burners, fume hoods, extraction apparatus and crude fiber apparatus are shown in a recent bulletin.

Materials of Construction

26. STAINLESS STEELS—Five attractive new bulletins giving information on various "Enduro" stainless steels for corrosion and heat resistance in industrial applications.

G. L. Montgomery, February, 1937
Managing Editor, Food Industries,
330 W. 42nd St., New York, N. Y.

TO THE READER: Use this convenient form to order the bulletins you need.

Please obtain for me the bulletins indicated by the following numbers:.....

.....

Name.....

Title..... Address.....

Company.....

THEY'RE AFTER YOUR MARKET

▶ AN ADVERTISING EARTHQUAKE centering around the New Orleans branch of A&P was felt in every corner of the food industries as the new year got under way. It was all caused by a little yellow handbill circulated in the Southern city. This screamed with punch headlines and staggering copy: "Compare—Save 29 Per Cent!—Here's proof!—We guarantee the quality to be equal! — These can be sold at a worthwhile saving because it is a one profit transaction—from A&P (the manufacturer) to you!" This copy focused attention on comparative prices (see illustration).

Paul S. Willis, president of Associated Grocery Manufacturers of America, placed this little promotional spree in the "category of unfair methods of competition." But A&P explained that the handbill was the brainstorm of local talent and not the work of the New York office, which put a different complexion on the situation. Some saw in the price comparisons a bid for public support in the face of the Patman bill preventing retailing by manufacturers. Others foresaw the use of new tactics by a large chain robbed of its price discounts by the Patman Act. But these surmises could be correct only if the handbill had been the work of A&P headquarters. In any event, a recurrence of this type of advertising is not expected soon. Earthquakes are not pleasant experiences, even in advertising offices.

▶ SEVENTEEN MILLION DOLLAR PAYROLL. That caption heads the first advertisement in a new campaign by Sheffield Farms Co., New York, to tell the public about the service rendered by the company and by the dairy industry and to point out the costs involved. Sheffield's campaign will run for six months, and perhaps for the entire year. The schedule includes metropolitan newspapers, daily and weekly suburban papers and foreign language papers. A current advertisement by Borden Co., New York, also sells the service of the industry. It tells what is involved in getting milk from the cow to the doorstep in New York and lists "facts about milk profit." Borden's campaign will parallel that of Sheffield Farms both in extent and in the nature of the copy.

▶ NOT TO BE OUTDONE by the educational activities of National Dairy Council, National Association of Margarine Manufacturers is distributing "The Story of Margarine." This 12-page manual—reading time 20 minutes—gives the history and development of margarine, placing emphasis on the nourishing qualities of the product. The booklet, of course, calls attention to the taxes and other restrictions placed on margarine by Federal and state legislators.

▶ ARMOUR'S LARGEST NEWSPAPER CAMPAIGN in its 50 years of national advertising is scheduled for this year. It will appear in 115 newspapers in 82 cities, in addition to one newspaper-magazine supplement and four national women's magazines. The copy appearing in January announced a $10,700 cash-prize meat recipe contest, which is unusual in that it requires of contestants no evidence of purchases. For the balance of the campaign, Armour's "Meal of the Month" will be the theme, this type of advertising having proven effective over the past two years. Two or three ads will appear monthly in each newspaper, these varying from 400 to 1,200 lines.

▶ THIRTY-SEVEN THOUSAND CHAIN STORES are cooperating in a campaign to push the sale of lamb to aid producers in marketing a surplus crop of nearly 3,000,000 head. The drive, which continues through the week of Feb. 15, is sponsored by National Association of Food Chains.

▶ PRACTICAL SALES HELPS for ice cream dealers will be made available by Ice Cream Merchandising Institute, Washington, D. C., in the form of a monthly news bulletin, "Ice Cream Currents." This merchandising tool can be obtained by ice cream manufacturers at four cents a copy for distribution to retailers, publication being scheduled to start Feb. 10. Eighteen subjects, ranging from recipes to training of help, will be covered in the various issues.

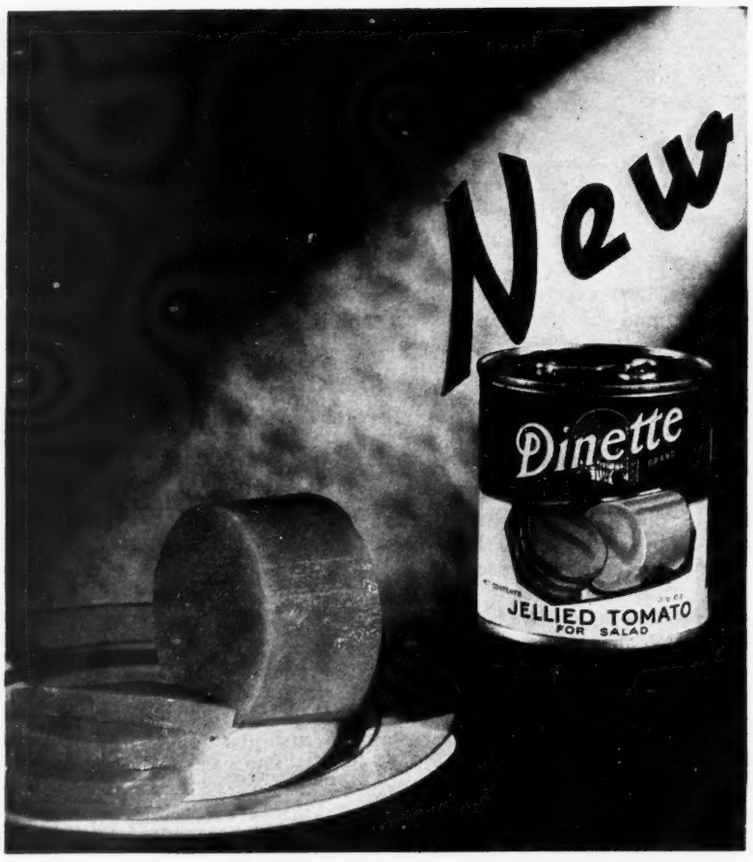
▶ NEW ON THE AIR WAVES are programs by California Packing Co., Purity Bakeries Service Corp. and Standard Brands, Inc. California Packing is broadcasting "Martha Deane" over WOR on Mondays, Wednesdays and Fridays, 11:30 to 11:45 a.m. EST. Purity Bakeries also is using WOR, the program being "Hope Alden's Romance"; the time, Mondays through Fridays from 4:00 to 4:15 p.m., EST. Standard Brands has substituted "Do You Want to be an Actor?" for the Chase & Sanborn "Good Will Court" over the NBC red network on Sundays at 8:00 p.m., EST.

Nationally Known Foods		Price	A & P's Own Manufacture		Price	SAVE
Heinz Ketchup	14 oz. bot.	23¢	Ann Page Ketchup	14 oz. bot.	15¢	8¢
Miracle Whip	pint	25¢	Rajah Salad Dressing	pint	19¢	6¢
Knox Gelatin	1 oz. pkg.	20¢	Sparkle Gelatin	1 oz. pkg.	10¢	10¢
Calumet Baking Powder	8 oz. can	13¢	Ann Page	8 oz. can	10¢	3¢
Cocomalt	8 oz. can	23¢	Coconog	6 oz. can	15¢	8¢
Cream-of-Wheat	28 oz. pkg.	25¢	Mello Wheat	28 oz. pkg.	17¢	8¢
Hershey's Cocoa	8 oz. can	10c	Ann Page Cocoa	8 oz. can	7¢	3¢
Jell-O or Royal	3¼ oz. pkg.	5½¢	Sparkle	3¼ oz. pkg.	4½¢	1¢
Campbell's Beans	16 oz. can	8¢	Ann Page Beans	16 oz. can	7½¢	½¢
Pet Milk	14½ oz. can	7½¢	Whitehouse Milk	14½ oz. can	7¢	½¢
Magnolia Milk	14 oz. can	12½¢	Whitehouse Condensed	14 oz. can	10¢	2½¢
Lipton's Tea	4 oz. pkg.	23¢	Nectar Tea	4 oz. pkg.	15¢	8¢
Luzianne Coffee	lb.	21¢	Crescent City Coffee	lb.	15¢	6¢
Kellogg's Corn Flakes	13 oz. pkg.	13¢	Sunnyfield Flakes	13 oz. pkg.	10¢	3¢
Quaker Oats	20 oz. pkg.	10¢	Sunnyfield Oats	20 oz. pkg.	7½¢	2½¢
Total Purchase.....		2.40	And On A & P's Own.....		1.70	70¢

A & P Handbill Compares Prices

Jellied Tomato for Salad

JELLIED TOMATO that can be sliced, diced, shoestringed or spread is the new product of Family Kitchen, Inc., San Francisco. It is more than jellied tomato juice. Seasoned and flavored, it is a jelly with a "set" that requires no refrigeration. It slides easily from the key-opened can and may be used for salads, sandwich spreads, canapes or as a garnish. "Dinette" can be heated in the can and poured into molds, with or without fish, meat and vegetables, to make molded salads that set at room temperatures.



Unusual Bottle

IN DEVELOPING A NEW CONTAINER for its tomato juice, Lippincott Co., Cincinnati, made a careful study of the public taste in glass packages. And it adopted a modern design with lots of eye appeal. The bottle has tapering sides, spiraled ridges and a rough finish which adds sparkle to the contents. But the label is what first catches the eye. Placed around the neck, the label has a wide band of light color above a narrow band in black. The bottle is closed with a crown cap.

Flaked Coffee in Bag

"SUPER CUP," product of Grand Union, Inc., New York, introduced but a short time ago, now steps forth in a new and sheer dress. Super Cup, the rapidly extractable coffee, flaked from ground coffee by extreme pressure rolls, adds visibility to the qualities of its package. The new package, an eye-catcher, splashes contrasting colors on transparent cellulose to obtain eye appeal and to permit customer scrutiny of the new product. The background color, brown, is the coffee itself, visible through the cellulose. Red and yellow are the package colors, overlaid with white lettering. Grand Union, Inc., still displays its product in vacuum-packed tin containers as well as in the new transparent-cellulose packages. The company is studying the merchandising value of both containers.

PACKAGES AND PRODUCTS

Low-Fat Cocoa

THERE IS LESS than one per cent of fat in the Lofat cocoa produced by Rockwood & Co., Brooklyn, N. Y. Sold to food manufacturers in single barrels at 6 cents a pound, the cocoa can be used in such products as cocoa-milk beverages, and it is said to be the first cocoa that would make a satisfactory chocolate marshmallow.

Soybean Granules

SEVERAL CHICAGO BAKERS have placed on the market bread containing 20 per cent of soybean granules. High in protein content, the bread has a nut-like flavor. The granules are supplied by National Consumers' Laboratories, Chicago, which developed a method of processing them on a commercial scale.

Package Avoids Waste

NO RIND, no waste, plus protected flavor, are advantages credited to a new type of package for natural American cheese. The cheese is wrapped in "Parafilm," a new material, which adheres closely to the product. It is this material that prevents the development of rind. Borden Sales Co., New York, is experimenting with this method of wrapping cheese, and the company is using a second wrapper of waxed paper and an outside carton of cardboard. Changes in the carton, however, are contemplated. The package illustrated contains five pounds.

Accent on Vinegar

LIBERALLY ENDOWED with sales appeal, the glass container for "Creole Accented Vinegar," reflects quality on the product which it carries to the consumer. Not only does the squat bottle with its long neck have pleasing lines, but it is adorned with metallic labels and by foil which covers the cap. The vinegar itself, the product of A. M. Richter Sons Co., Manitowoc, Wis., is produced by blending several vinegars and treating them with French herbs and spices.

Codfish in Vacuum Tin

BETTER PRESERVATION OF THE PRODUCT, together with more shelf appeal, is attained in a new package for salt codfish. Adopted by Robinson Fisheries Co., Anacortes, Wash., the container is a one-pound vacuum tin neatly lithographed for display. In the way of preservation, the can eliminates drying, yellowing and salt crystallization.

Rum Beverage

"RUM OLA," a new extract for making beverages, has been introduced by OLA Laboratories, Inc., Brooklyn, N. Y. It is made from rum by taking the alcohol out of the liquor. As ordinarily used, it is mixed with water and sugar, although it can be employed for flavoring other beverages. It can be carbonated and is suitable for serving hot or cold. One gallon of the extract produces 350 cases of 6-oz. bottles.

Borrows Beer Bottle

FIRST USED BY BREWERS, the stubby type of glass bottle is finding favor among other food and beverage manufacturers. This time it's a tomato-juice packer, Vincennes (Ind.) Packing Corp. This company's "Alice of Old Vincennes" line is vapor-vacuum packed and is sealed with a pry-off reclosing cap.

Recipes Under Label

THE COMPANY which built a good business on canned rattlesnake meat has applied a new idea in labeling its "Frog Legs with Jungle Sauce." The concern is Floridian Products Corp., Arcadia. The new idea involves putting a sheet of recipes around the can underneath the label. By cutting along a dotted line, the consumer frees the label and also the recipe sheet under it.

Honey-Butter Spread

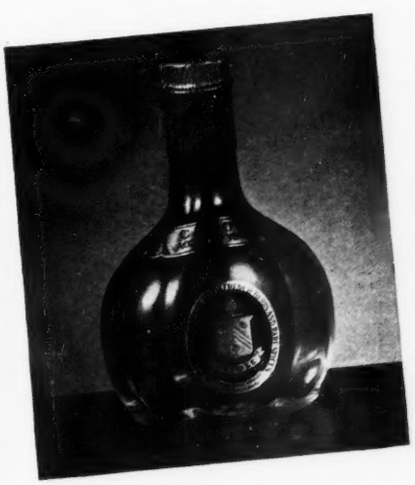
HE-NE BE-NE is the name of a bread spread consisting of honey and butter. Its manufacturers say that "children love it," and a baby can be taught to call it by name. Waltham System, Inc., Buffalo, processes it under a license from Cornell Research Foundation, Inc. The butter moderates the sweetness of the honey, and the two products are said to be "counter digestants."

Frosted Oysters

QUICK-FREEZING is being applied to the preservation of oysters. Done in six hours at a temperature of —20 deg. F., the process keeps the oysters "fresh" until they reach the consumer. The freezing is carried out at the plant of Glacier Bay Oyster Co., South Bend, Wash. Opened Nov. 1, the plant has the capacity to freeze 200 gal. of oysters an hour.

Apricot Nectar

AFTER several years of experimental work, Richmond-Chase Co., San Jose, Calif., has introduced a new apricot product. It consists of fresh apricot pulp with added sugar and water. It is packed in No. 10 and No. 5 cans.



BUSINESS TRENDS

Commodity Prices Soar

MOST PEOPLE REGARD SPECULATION in commodities as a necessary factor in the maintenance of a stable price level. And it generally is just that. But when speculation raises the level too high, the inevitable reaction is likely to be dangerous to the food producer and processor, alike.

In view of this fact, the present commodity price level, and the trends recently exhibited by commodity prices, should be viewed with caution.

Apparently, the recent sharp price rises in raw food materials and other commodities had its inception in London. English traders, having exhausted the profit possibilities of the London equity markets some months ago, turned to speculation in commodities. Since then, much of the price rise has been the result of outright gambling.

However, at least half of the current price rise was justified by the supply situation. So, if the rise eases off in the next few weeks, as now seems likely, prices should again become stable in relation to supply without the occurrence of a break severe enough to cause the correction to be overdone.

Wheat Wobbles

STRENGTH IN THE WHEAT MARKET has been based on the short 1936 world crop and the small world export wheat surplus, which on Aug. 1 last was estimated to be only 652,000,000 bu. Depletion of this carryover stock has been at a rate which indicates that little, if any, will be available by Aug. 1 of this year.

Acting with this supply situation to form a basis for speculative increase in wheat prices, has been the European war scare. While this factor has influenced the price, it is not apparent that there has been much anticipatory buying. The world movement of wheat and flour for the last five months of 1936 was at a rate of only 37,000,000 bu. higher for the 1936-37 year than for the 1935-36 year. This might be largely accounted for by imports of about 1,000,000 bu. weekly of Canadian wheat into the U.S. to make up for the shortage in certain domestic types of the grain.

In contrast, prospects for a normal, or more than normal, world wheat crop this year have tended to cause a price reaction. Wheat prices consequently went somewhat lower during January. With grain prices showing the largest gain, 58.4 per cent, of any commodity group for the eight months, mid-May, 1936, to mid-January, 1937, it was not unlooked for that some reaction should occur. It may well be that the advance in wheat has been halted, at least until more information on 1937 crop prospects and war threats is available.

Construction News

	Pending (thousands)	Awarded January (thousands)	Total Awarded 1936 (thousands)
Bakery	$130	$224	$2,382
Beverages	372	712	9,478
Canning and Preserving	40	....	395
Confectionery	....	....	67
Grain Mill Products	325	187	4,278
Ice Manufactured	30	40	691
Meats and Meat Products	130	170	2,819
Milk Products	115	137	1,862
Miscellaneous	640	507	6,667
	$1,782	$1,977	$28,639

Cocoa Fireworks

THE DECEMBER 10c-LEVEL predicted for cocoa beans, in November, has been far exceeded. In fact, the price level rose close to 12c in December, and passed 13c by the middle of January.

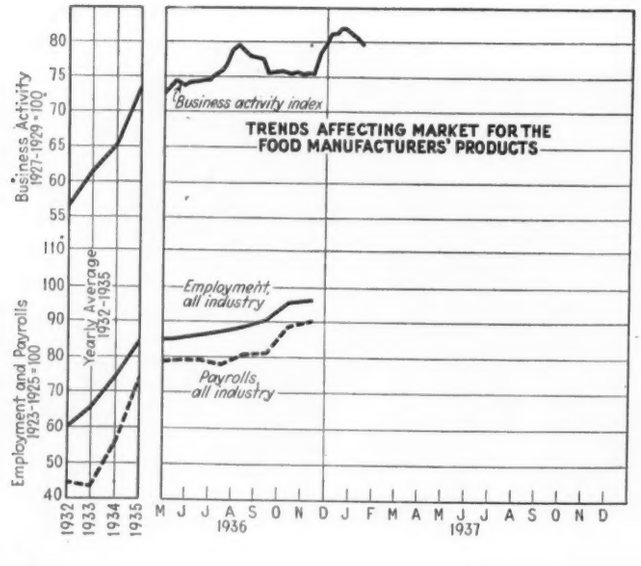
Discounting the brief declines caused by chip cashing on the part of the market poker players, the rise has been both consistent and, apparently, well grounded. In spite of U.S. imports in 1936 of 4,312,518 bags, compared to 3,883,593 bags in 1935, stocks in New York warehouses fell from 789,075 bags to 517,726 bags during the year. Apparent deliveries for consumption in 1936 were 4,573,000 bags, an increase of 14 per cent over the preceding year, and a record.

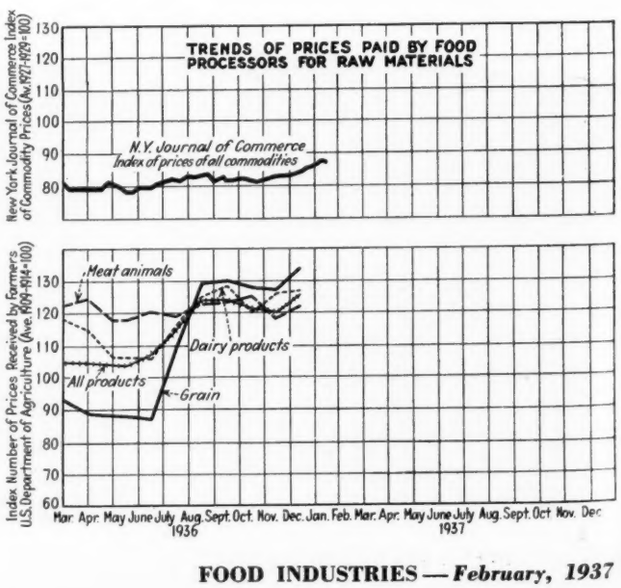
These figures plainly indicate that the consumption level for cocoa beans has made a definite rise. Along with this fact, it is now definitely known that the 1936-37 crop will be smaller than usual. There is only one important crop still to be marketed, that of the African Gold Coast. When this crop is marketed, the cocoa bean supply situation will be definitely known, until the 1937-38 crop is available later in the year.

Fireworks in the cocoa bean market would seem, therefore to be justified, particularly in view of the fact that requirements for the Easter season are still, in part, to be met.

Oils and Fats Gain

INCREASED WORLD DEMAND for edible oils and fats has combined with a restricted supply situation to form the basis of a sharp price increase in these commodities. While some of this rise




TRENDS OF PRICES PAID BY FOOD PROCESSORS FOR RAW MATERIALS
New York Journal of Commerce Index of Commodity Prices (Av. 1927-1929=100)
N.Y. Journal of Commerce Index of prices of all commodities
Index Number of Prices Received by Farmers U.S. Department of Agriculture (Ave. 1909-1914=100)
Meat animals
Dairy products
All products
Grain
1936
1937

Business Advance Slows Up

STRIKES, floods, price advances, and cessation of the heavy holiday buying are having an evident depressing effect upon general business activity.

At 79.3 per cent of "normal" for the week ending Jan. 23, the *Business Week* index of general business conditions is 4.92 per cent off of its peak of a month ago. Even at this depressed figure it still is at early 1931 levels; the best in six years. Carloadings, building and construction contracts, and automobile production are the weak factors. Steel production, coal output, electric power consumption and machine tool orders are still going strong. While commodity prices have weakened many are still higher than a month ago.

U.S. Department of Labor reports the wholesale price of all commodities to be 2.39 per cent higher for the month ending Jan. 16. Farm products and food prices have advanced 5.24 and 2.58 per cent, respectively. Weighted price indexes of the New York *Journal of Commerce* show a 0.46 per cent advance in all price indexes for the month ending Jan. 23, while the index of grain prices declined 3.36 per cent, and that of food prices fell 3.38 per cent.

is purely speculative in character, much of it is certainly justified by supply and demand conditions.

In the U.S. the drought of last summer sharply reduced potential supplies of oils and fats. Cottonseed oil and lard prices are particularly influenced by this situation. At the same time, copra has become both scarce and dear. Hence prices of the three most important edible fat and oil products have increased from 40 to 100 per cent during the past year. Soybean oil has also increased in price by 40 per cent since last June, and corn and peanut oils have followed the increase in cottonseed oil.

Non-edible oils for soaps and paints have followed the same course. As some of the edible group also hold an important place as soap oils, the whole oils and fats market tends to be affected by the supply situation of the edible group.

Butter output in the U.S. has been running at levels less than normal and below last year's output. However, the import situation still holds butter prices to a point where imports are kept down.

Olive oil supplies are low, with the current output in the Mediterranean basin the lowest in years, only about 75 per cent of normal. These conditions will hold the prices at the present high level unless the Spanish trouble is shortly settled, when some decline may be expected.

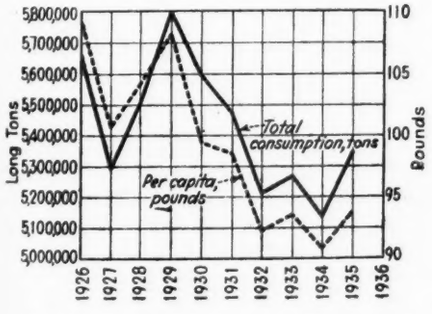
Prospects for the future in the U.S. edible oil and fat market are for ample supplies, except for lard and butter. Output of both of these fats will continue below normal for the remainder of 1937, as the effect of the 1936 drought cannot be repaired in less than two or three years. Cottonseed supplies are expected to be at normal levels in 1937, and it is unlikely that the current restriction in copra output will continue much longer, as the existing price level should encourage the growers again to harvest and market their crop in normal manner. Hence two of the other most important edible fats and oils should soon be in normal supply again, and a downward correction of the present price level is in prospect.

Eggs on Local Spree

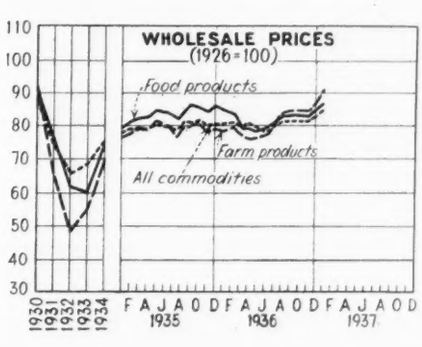
EGG PRICES, at retail, advanced in December and early January to a point that could not be sustained in the face of the larger than normal production encouraged by the mild winter. This price rise did not reach down to the producers to any extent. And, with feed prices high, the farmers began to cut down on the size of the flocks.

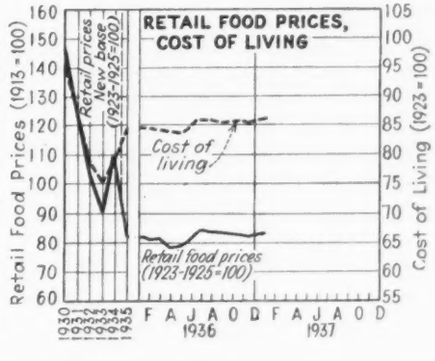
General Outlook

IT IS EVIDENT from a consideration of the supply and demand situation among the commodities which form the raw materials of food manufacture, that the general price level will be higher during 1937 than it was in 1936. It is also likely that at least some of that part of current prices that represent pure speculation will disappear within the next three months.



Prices received by farmers are from the U. S. Department of Agriculture. Employment, payrolls, wholesale prices and retail prices from the U. S. Department of Labor. The business activity index is that of *The Business Week*. The cost of living index is from the National Industrial Conference Board. The curve above, based on figures from the Department of Commerce, shows recent variations in sugar consumption.





INDICATORS

SUGAR PRODUCTION in Louisiana in 1936 was the largest on record, with a total of 343,000 short tons, an increase of 10,000 tons over 1935.

SUGAR CONSUMPTION in 1937, provided there is a normal fruit crop, should be greater than in 1936, because of the increased consumer purchasing power available.

CONFECTIONERY and competitive chocolate product sales in November, 1936, the latest month for which figures are available, were $27,014,180, an increase of 12.2 per cent over the sales for that month of 1935.

FISH LANDINGS in New England during November, 1936, were 37,182,000 lb. This was an increase of 44 per cent over the landings for the same month of the previous year.

FISH IN COLD STORAGE in the United States on Dec. 15, 1936, totaled 94,655,000 lb., compared to 75,056,000 lb. on the same date in 1935.

TOMATO JUICE PACK continued to rise in 1936, with a total of 12,608,159 actual cases, compared to 8,170,640 actual cases in 1935. This increase was almost exactly equal in number of cases to the falling off in standard cases of tomatoes packed in the same years.

MEAT PRICES, WHOLESALE, CHICAGO, were lower in December, 1936, than in the same month of 1935, with pork loins off 11 per cent, beef off 2 per cent, veal down 3 per cent, and lamb 24 per cent lower.

EGGS IN STORAGE on Jan. 1 of this year were about 20 per cent below the five year average, with only 650,000 cases reported.

WHOLESALE FOOD PRICES, according to the Dun and Bradstreet weekly index, stood at the highest point in seven years in the middle of January, when a figure of $2.99 was recorded, up 11.2 per cent in one year.

Keeping Up WITH THE FIELD

Proposed Legislation — What's Doing at Washington — Government Rulings—Foreign Trade—Complaints—Investigations

More Patman Complaints—Two more Patman Act complaints have been chalked up by the Federal Trade Commission. A&P, which seemed to be unlucky in January, is one of the alleged violators. The other is Biddle Purchasing Co., New York, together with 13 companies using its services for buying or selling.

In both cases, FTC charges violation of section 2(c) of the act. This outlaws payment or acceptance of unearned brokerage, allowances or discounts.

A&P is accused of accepting allowances and discounts from numerous companies, the following being named: Alton Canning Co., Inc., Alton, N. Y.; Fred B. Huxley, Alton, N. Y.; H. J. McGrath Co., Baltimore; H. C. Roberts, Baltimore; R. J. Peacock Canning Co., Lubec, Me.; Phillips Packing Co., Inc., Cambridge, Md.

The complaint against the Biddle company alleges that the sellers paid a so-called brokerage fee or commission, usually between one and five per cent of the quoted sale price, which Biddle in turn paid over to the buyers.

Some 2,400 buyers subscribed to Biddle's service, and seven are named in the complaint. Six sellers are listed. They include: Dannemiller Coffee Co., Brooklyn, N. Y.; Colonial Molasses Co., Inc., Brooklyn; Albert Dickinson Co., Chicago; Ervin A. Rice Co., Chicago; Cava Packing Co., Salinas, Calif., and Godchaux Sugars, Inc., New Orleans.

A&P Gets Desist Order—Practices held to violate the Packers and Stockyards Act must be stopped by Great Atlantic & Pacific Tea Co. by Feb. 2. Such is the order of Secretary Wallace. The outlawed practices were said to give A&P unfair advantage over competitors. They are: (1) Concealment of the true relationship existing between the company and an employee or agency authorized to purchase meat for its account; (2) permitting an employee to make representation to the effect that he is in the brokerage business when, in fact, he is purchasing meat supplies from meat packers for the company's account; and (3) permitting an employee of the company to collect from a meat packer a charge that exceeds the actual or reasonable expense incurred in providing the service rendered.

A&P denied that it was a packer as defined by the Packers and Stockyards Act, but the government maintained that it not only shipped a large volume of meat in interstate commerce but treated the meat in different ways at its warehouses.

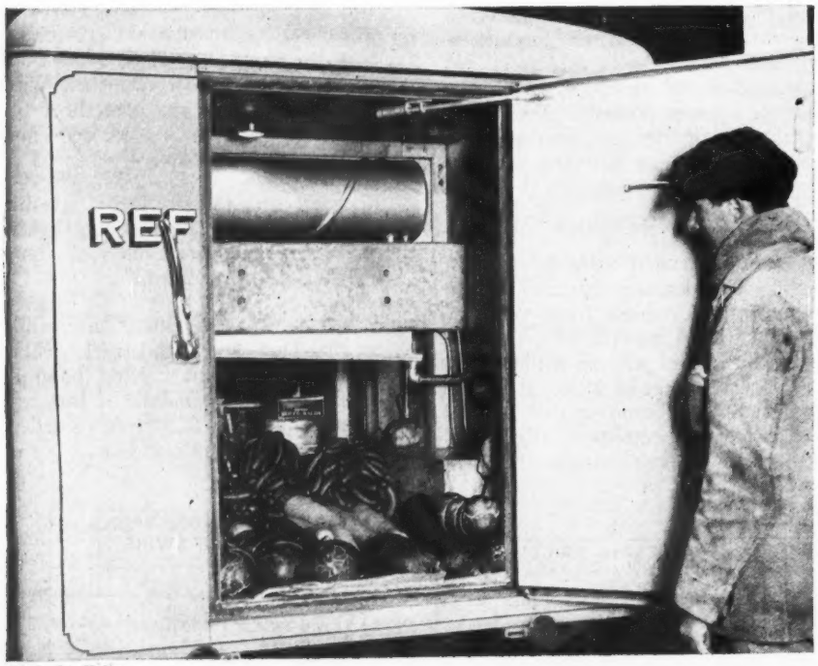


Photo by Holbran

NO ICE OR COMPRESSORS NEEDED

An adaptation of the absorption method of refrigeration has been applied to food trucks. Anhydrous ammonia contained in a tank inside the truck takes up heat as it changes to gas, the gas being absorbed by a weak aqua ammonia solution in two tanks under the body. Horizontal pipes with fins provide the cooling surface, these being connected to the anhydrous-ammonia tank. One charge of refrigerant is good for 48 hours in hot weather. A control valve regulates the temperature. The system was developed by General Frigid Transportation Co., New York.

Biggest Packaging Show. It will be the largest in history and the most important ever held. That is what those in charge are saying about the Seventh Annual Packaging Exposition to be held in New York, March 23-26. The show will occupy 25 per cent more space than last year, and the conferences will consider important packaging problems brought up by the Robinson-Patman Act and the "fair trade" decision recently handed down by the Supreme Court.

The Exposition will include not only the packages entered in the Irwin D. Wolf competition, but packaging machinery and supplies. It is sponsored by American Management Association.

Proposed in Congress—Several bills affecting the operations of food manufacturers and their source of supplies were introduced in the first weeks of the new session of Congress. Most important of these are the food and drug bills, S. 5 and H.R. 300, discussed at length elsewhere in this issue (page 70). Another measure affecting the entire food industries, as well as other businesses, is the O'Mahoney bill (S. 10). This is a curtain raiser for legislation to give Congress some control

over hours and wages and corporate business in general. It would prescribe conditions under which corporations may engage in interstate and foreign commerce and provide for and define additional duties of the Federal Trade Commission.

Among the legislation pertaining to the business of producing food is the bill introduced by Representative Stefan (H. R. 2262). It would authorize an inquiry into the material factors contributing to the disparity between prices commanded by agricultural commodities and the prices of commodities which are purchased from the proceeds of the sale of agricultural commodities. An ambitious bill (H. R. 2731) was introduced by Representative Eicher. It would restore and stabilize agricultural buying power by regulating interstate and foreign commerce, establishing minimum prices for farm commodities and providing for orderly marketing of "domestic and export percentages" of these products. Ten million dollars would be appropriated annually to purchase pasture land under a bill (H. R. 2287) introduced by Representative Ferguson. If a bill proposed by Senator Frazier (S. 848) were to become law, $100,000,000 would be set aside to form the capital stock of a "Farmers' and Consumers' Financing Corp." This corporation would be authorized to buy, build, lease and operate elevators and storage warehouses, to purchase farm products and to process and sell such products, to act as an agent for farmers and lastly, to "make advances for the purposes of assisting any person in financing the sale or exportation of such agricultural products."

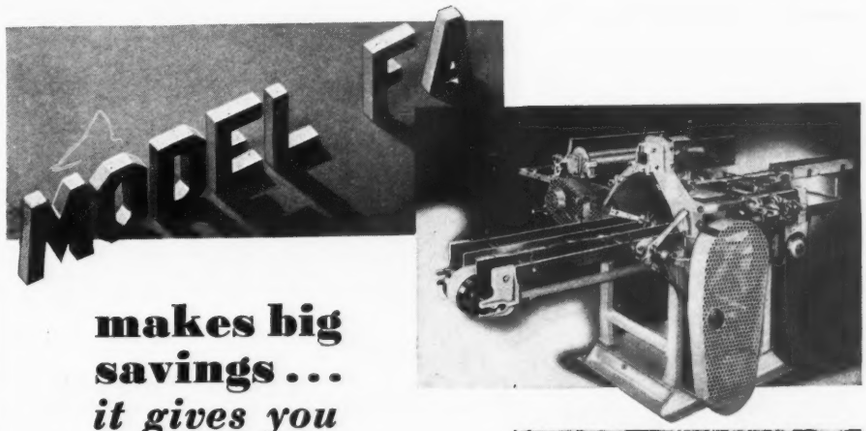
Always a popular object of legislative restrictions, oleomargarine comes in for a heavy share of the bills introduced in Congress. Representative Kleberg introduced two measures, one of which (H. R. 66) would levy an additional tax of 10 cents a pound against all oleomargarine not made from domestic fats and oils. His other bill (H. R. 65) would prohibit shipment in interstate commerce of oleomargarine containing less than 80 per cent of fat or oil by weight. Representative Culkin also sponsored two oleomargarine measures—H. R. 19, which would add 10 cents a pound to the taxes now levied on oleomargarine; and H. R. 25, which goes the whole way and seeks to prohibit the manufacture, importation or sale of oleomargarine or other butter substitutes made "wholly or in part from any fat other than that of milk or cream." The bills on oleomargarine seem to be sired in pairs, for Representative Smith also introduced two measures. His H. R. 95 is similar to H. R. 25 and prohibits oleomargarine entirely, while his H. R. 93 would assess 6 cents a pound on uncolored and 10 cents on yellow oleomargarine. This latter bill would also increase the levies against manufacturers and wholesalers of oleomargarine.

An excise tax on eggs and egg products is the object of H. R. 87, introduced by Representative Sanders. The tax would be 25 cents a pound on dried eggs, 60 cents on dried egg albumen, 5 cents a pound on frozen or preserved egg yolk, and 1 cent on frozen or preserved whole eggs.

The tax on Philippine coconut oil would be removed under S. 788, fostered by Senator Guffey, and by H. R. 1988, introduced by Representative Dockweiler.

Final Report on Milk—Milk dealers are criticized on five main counts in the Federal Trade Commission's final report on the industry. And the Commission highly commends the work of non-profit producers' cooperatives and recommends their expansion.

Where milk sheds overlap State lines, the FTC advises the States to enter into compacts under advisory authority to be created by new legislation. Representative H. P. Kopplemann will sponsor the suggested legislation. The Department of Agriculture assumes that any new federal authority would be



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1. ***Low initial cost***
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Many concerns have installed the Model FA in their plants—food, drug, candy, cigar, match, and other manufacturers. And they are realizing the large savings which this remarkable wrapping machine affords.

Only 6'6"x5', the compact FA offers advantages formerly obtainable only in the most expensive machines. For example: it wraps a wide variety of sizes and shapes; it can be equipped to handle transparent cellulose, glassine, waxed paper, foil, or other wrappers. For printed material in roll form, electric eye registration is furnished—locates the printing accurately on the package, no matter how long the run.

Particularly at this time, when new economies are so necessary to offset rising costs, it will pay you to look into the substantial savings which this machine makes possible. Write for literature.

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Over a Quarter Billion Packages per day are wrapped on our Machines

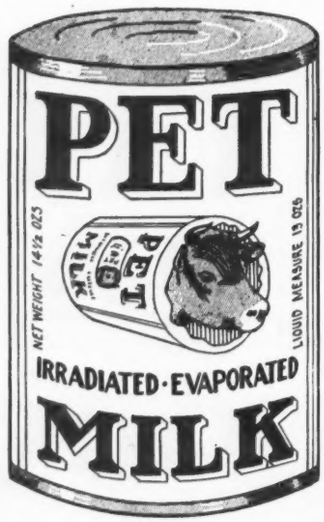
administered through its Dairy Division, which is already developing joint federal-state agreements along the lines of the one now effective in Indiana.

Principal charges placed against the dealers by the Commission are: (1) Price increases are invariably charged to consumers while losses are always passed down to producers. (2) Reports on sale of milk by classifications have not been properly audited to the producers. (3) Distributors have influenced some cooperatives to the detriment of producers. (4) Purchasing power and the "use" plan of payment have been manipulated to depress prices. (5) Secret rebates and special discounts appear to have been made, and the question of violation of the Robinson-Patman anti-price-discrimination act will be further investigated. Presumably, Kopplemann's bill will be aimed at these alleged abuses.

The Commission further states that some large milk and milk processing concerns have become large through acquisition of competing concerns in violation of the Clayton Act, and emphasizes necessity for its amendment.

On the other hand, the Commission approves of exemption of producer's cooperatives under the antitrust laws. It recommends that cooperatives take full advantage of existing federal and state laws to establish common marketing agencies, to enter into written contracts with distributors and even to "lease or acquire and operate" processing plants to dispose profitably of excess production where no satisfactory outlet already exists.

New Oyster Industry. So rapidly has oyster production in the coastal coves of Washington expanded that an estimated 5,000,000 bu. of the shellfish will be harvested this year. A few years ago, the first Japanese oyster seed was transplanted to Washington waters, and now the State's oyster business exceeds a million dollars a year. Large modern oyster canneries and freezing plants have been set up, and several leading salmon canneries have installed oyster-canning equipment so as to operate throughout the year.



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Whether you use heat for can-making, roasting, baking or high temperature cooking, Kemp offers you the advantages sought by the engineers of the PET Milk Company.

1. The Kemp Industrial Carburetor *pre-mixes* gas and air so it will give the desired *kind* of flame on any number of burners, even pressure and uniform heat liberation without regard to fluctuations in service line pressure.
2. Kemp equipment will give you material fuel saving, *no matter what you now use.* We tell you in advance how much it will save, *and guarantee this performance.*

THE INDUSTRIAL · KEMP · CARBURETOR

Write the **C. M. Kemp Mfg. Co., 405 East Oliver Street, Baltimore, Md.**

KEMP of BALTIMORE

CONCENTRATES

• *Processing-tax refunds are being made to flour buyers by Standard Milling Co., Commander-Larabee Milling Co. and B. A. Eckhart Milling Co.*

• Sales made to the government are not subject to the anti-price-discrimination provisions of the Robinson-Patman Act, according to a ruling by Attorney-General Cummings.

• *Because of alleged refusal of Borden Co. to allow examination of its books and records, the New York State Milk Control Division recently sought to revoke the company's license as a milk dealer.*

• Attorneys for Swift & Co. protested that a Department of Agriculture hearing in New York had "degenerated into a proceeding in which we are being persecuted under the guise of a government hearing." The government is investigating alleged unfair and discriminatory practices in the sale of meat.

• *Great progress in improving and standardizing the quality of beet sugar has been made during the past four years, it is reported by the Bureau of Chemistry and Soils.*

• The Food and Drug Administration has become concerned over the growing practice of applying such label designations as "Sweet Pickled Peaches" to canned fruit which differs from the ordinary article only in that it is packed in a sugar solution to which spice and vinegar, or acetic acid, have been added.

• *A model State bill patterned after the Patman Act is being circulated for sponsorship in State legislatures. The bill is said to be backed by grocers and druggists.*

• Eighty-eight per cent of the milk consumed in the country is now pasteurized, according to Dr. Shirley W. Wynne, former health commissioner of New York.

CAPITAL VIEWS

FOOD EXECUTIVES will have more than a baker's dozen of troublesome questions pending in Washington for the balance of the winter and spring. The outstanding ones on which the issues can now be defined, but regarding which the outcome is doubtful, include the following:

» FOOD AND DRUG LAW—The two fundamental controversies which delay enactment of a more comprehensive law remain as last year. The first and most conspicuous argument is regarding the agency to regulate advertising, whether it shall be the Food & Drug Administration or the Federal Trade Commission. Less conspicuous, but perhaps equally potent as a factor in delay, is the tactical uncertainty of Administration leaders as to whether mere revision of the present law or enactment of a completely new law will be best. It will be some months before any new legislation can take final form ready for the President's approval, which is assured. It may even prove impossible to finish enactment this year, but early 1938 will undoubtedly see a new food and drug bill advanced to an act on the statute books.

» ROBINSON - PATMAN ENFORCEMENT—Fundamental policy-making "complaints" of the Federal Trade Commission appear at frequent intervals. During January, FTC joined issue with A&P to determine the really fundamental question as to the effect of this law on chain-store merchandising. Previous questions on cheese, yeast, floor coverings and other non-food products are important, but none is so fundamental as affecting food distribution policy. It will take at least a year, possibly several years, before final court decisions are reached in these important policy-making cases.

» AGRICULTURAL AIDS—A peculiar combination of conflicting influences will accentuate this year the fundamental defects of the farm relief policies under which Secretary Wallace and his department struggle. These officials want to advance agricultural goods prices, but they also want to increase total farm production, as these two factors are coordinate in importance for the increase of total farm income. The soil-conservation plan is working well in some respects, as a distributor of federal funds to farmers, but gives promise of breaking down in 1937 as an agency of crop curtailment. Hence the talk about Washington regarding reenactment of the principles of AAA. Wallace knows that he cannot count on providential droughts for annual cooperation, and privately his experts admit that the droughts more than the department aided the farmers in the last triennium. The fact that agricultural income last year was much higher than in any other recent season does not discourage official "relief" efforts.

CONVENTIONS

FEBRUARY

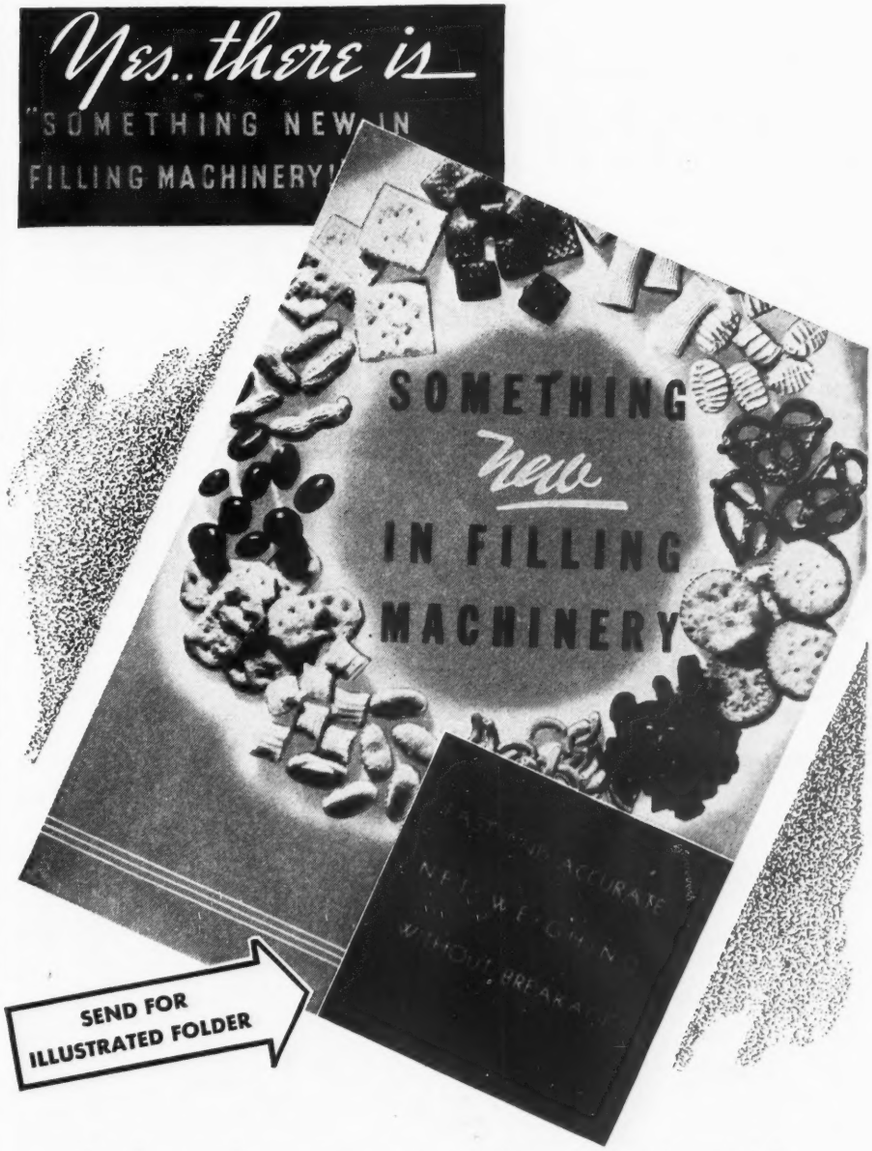
8-11—Annual Personnel Conference of American Management Association, Benjamin Franklin Hotel, Philadelphia.

MARCH

7-11—American Society of Bakery Engineers, Edgewater Beach Hotel, Chicago.

12-13—National Association of Bakers' and Confectioners' Supply Houses, spring meeting, Edgewater Beach Hotel, Chicago.

23-26—Seventh Annual Packaging Exposition, with conferences, Sponsored by American Management Association, Hotel Pennsylvania, New York.



For fast and accurate net weighing without breakage the S & S Conveyor Net Weight Scale is a great innovation. It rapidly and accurately weighs and fills crackers, candies, nuts, short macaroni and many similar materials. Two models are now available. Write for a copy of the folder "Something New in Filling Machinery" which describes these fillers in detail.

STOKES & SMITH Co
PACKAGING MACHINERY PAPER BOX MACHINERY
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» MILK, A PUBLIC UTILITY—The final report of the milk investigation by the Federal Trade Commission is a first step toward establishing the milk-distributing industry as a public utility, so many of Washington hope. These reformers are, however, wholly unwilling to accord to a milk-distributing unit that non-competitive status which is basic of all other utility enterprises which under the law are fully subject to local, state or federal regulation. It is mere speculation now, but the farseeing of Washington are wondering whether this reasoning may not soon lead New Dealers to the dual conclusion that monopolies in distribution are necessary for efficiency and that public ownership is preferable to the utility type of regulation.

» SUGAR TAX—Secretary Wallace wants a special processing tax on sugar. He thinks refiners' profits are "unreasonable." Business success polishes up any industry as a shining target for reform attack from Washington. "Bigness is badness" is not quite as conspicuous a theme song as formerly, but it is not a forgotten one.

EXPANDING PRODUCTION

by Continuous Flow

IN many plants where Mathews engineers have installed continuous flow equipment, raw materials start at the top of multi-storied buildings and flow downward through all of the succeeding processes.

One reason why Mathews engineers are able to unify plant operations, no matter how diversified, is that they are trained to see production as just one process from start to finish.

Placing all processes in logical sequence so that materials travel continuously in one direction is the dominant principle in all modern manufacturing.

This principle applies especially in the packaged food industries. Filling, sealing, labeling, packing operations, etc., are kept continuous. Equipment operates at highest efficiency *when all these processes are integrated* by Mathews conveyers, and continuous flow extends to sorting, storing and shipping.

A Mathews survey by trained production engineers almost always reveals new opportunities for lowering costs, expanding output, eliminating bottlenecks and lost motion. Mathews engineers are located in 29 industrial centers.

"Problems Solved with Mathews Conveyer Systems" is a book which illustrates many typical examples of the Continuous Flow Principle. Write for it today.

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MORE PATMAN LAW—Representative Patman, a growing power in Congress, definitely plans legislation intended to prevent retail merchandising by any manufacturer. This, rather than any amendment of the present R-P Law, will be the technique of chain discipline this season.

» SUPREME COURT—The Supreme Court has afforded two new firm bases for New Deal progress recently. Despite this, it remains the target of subtle innuendo and much attack that is none too subtle. It will probably be another year before a sufficient "build-up" of unfriendliness can be accomplished for open effort to be made by the Administration either for Constitutional amendments or discipline of the Court, probably by increased number of justices.

» LABOR TROUBLES—Strikes as a weapon of labor benefit are not encouraged by official Washington. But the attitude is often dangerously close to encouragement. Many strikes are to be expected. Much bitterness and some bloodshed will result. Washington, though denying in words, confirms by action the charge that it sets labor against employers as conflicting social forces. The "class issue" remains dominant in much of the reform desired.

» FOOD STANDARDS — Almost weekly, more rigid definitions of food quality or food identity are being issued by the Department of Agriculture. The Food and Drug Administration is tightening up on the laggard producers by this means. It gives evidence of an intention to tighten up also on those careless regarding the quantity of spray residue remaining on fruits and vegetables.

» COOPERATIVES—Farm organizations for cooperative buying and selling will have continued encouragement in official circles. Little long-time fundamental influence on trade can be expected unless the American habit of individualism is changed by the habits of New Deal regimentation. Co-op backers know this and are privately none too optimistic. But the co-op idea will have official encouragement everywhere, at least as a smoke-screen offset for the general public distress with increased cost of living.

» POULTRY AID—Since a chicken could kill the Blue Eagle, one must reason that the proposed "Bureau of Poultry Industry" should be favorably considered. Feed shortages, which have been bad enough for stock raisers, have occasioned even more distress in the poultry industry. Some aggressive technique of relief is required, the Department avers. A Bureau of Poultry Industry may be the answer. It would not have any new functions not already exercised by the Department but would occasion enlarged activity.

MEN, JOBS *and* COMPANIES

Industry

» ATLAS MALTING Co. is building at Bay City, Mich., what is said to be the world's largest malting plant. The annual capacity will be 14,000,000 bu. of barley malt.

» BAKE RITE BAKERIES, INC., recently took over Golden Krust Bakery, Portland, Ore.

» BALLARD & BALLARD, Louisville, has purchased the plant of Ashland (Ky.) Milling Co.

» BORDEN Co. has purchased a six-story building in New York which it will convert into a pasteurizing and distributing plant at a cost of $200,000, not including equipment.

» HAROLD H. CLAPP, INC., Rochester, N. Y., plans to build a new plant this year. Of the past 15 years, 1936 was the most successful for the company. Baby food sales increased by 100 per cent during the year.

» FALSTAFF BREWING CORP., St. Louis, recently purchased National Brewery, New Orleans. The acquired brewery has a capacity of 150,000 bbl. annually, and plans are being made for additions to its storage and bottling facilities.

» FREEMONT (MICH.) CANNING Co. will add 21,000 sq.ft. of floor space to its facilities.

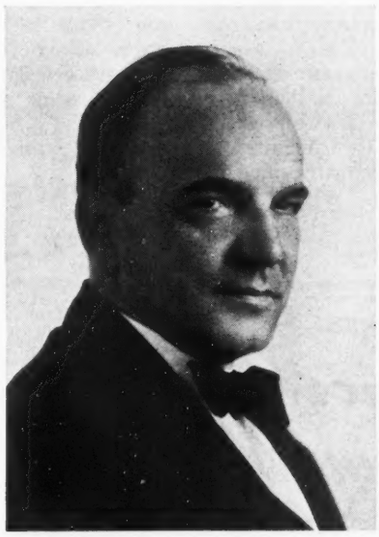
» GENERAL FOODS CORP., New York, has purchased certain properties of Arbuckle Bros., Brooklyn. Among the popular coffee brands figuring in the transaction is "Ariosa" (which at one time outsold all other coffee brands in the nation), "Seven Day", "A-B", "Certified", and "Plainsman". Production will be handled by the Maxwell House division of General Foods.

» JOHNSON EDUCATOR BISCUIT Co. will merge with Johnson Educator Food Co. and Star Biscuits of America, Inc. The consolidated company will be headed by R. L. Megowen and Ralph L. Smith. Mr. Megowen is vice-president of Salerno-Megowen Biscuit Co., Chicago. Mr. Smith is president and general manager of the Star company.

» KRAFT-PHENIX CHEESE CORP. has opened a plant at Lamesa, Texas.

» LOOSE-WILES BISCUIT Co. will build warehouses at Huntington, and Charleston, W. Va.

» MINNESOTA VALLEY CANNING Co., LeSueur, Minn., will build a canning plant near South Martinsburg, Pa. This move follows successful experiments in the growing of corn and peas in Blair and Bedford Counties.



FRANK C. WHITMORE

Dean of the school of chemistry and physics of Pennsylvania State College, he has been elected president of American Chemical Society for 1938. Dr. Edward R. Weidlein, director of Mellon Institute of Industrial Research, Pittsburgh, is president of the Association for 1937.

M. LINCOLN WILSON

He takes over the position of Undersecretary of Agriculture vacated by Rexford G. Tugwell when he resigned to go with American Molasses Co. Mr. Wilson had been Assistant Secretary of Agriculture and is credited with writing the original AAAct. He is a former professor of agricultural economics at Montana State College.

» NESTLÉS MILK PRODUCTS Co. has purchased the Tuscaloosa, Ala., plant of Libby, McNeill & Libby Co. Arthur Isaacson has been made manager.

» OMAR BAKING Co. is making a $90,000 addition to its plant at Indianapolis, to be used for the manufacture of sweet rolls.

» PHILLIPS PACKING Co., Cambridge, Md., has added oyster soup to its line.

» PLANTERS NUT & CHOCOLATE Co., Suffolk, Va., recently increased wages by 10 per cent. This brings the pay to three cents an hour more than paid under NRA.

» JOSEPH SCHLITZ BREWING Co., Milwaukee, has increased its capital stock from $1,000,000 to $2,000,000. This follows an expansion of operations.

» SWIFT & Co. plans to build a $750,000 edibile-oil refinery at Newark, N. J. The plant will have a capacity of from 50,000,000 to 75,000,000 lb. per year. The processing to be done includes the refining of crude oils and the making of shortening, salad oil, cooking oil and miscellaneous technical oils. The new plant will take care of Swift's shortening and oil business in New England and the Middle Atlantic States.

Personnel

» R. A. ALEXANDER, who has been with F. E. Booth Co., Inc., at San Francisco for 15 years, is now assistant to the president.

» C. E. ANDERSON, San Francisco, recently was elected vice-president of Sperry Flour Co., subsidiary of General Mills, Inc., Minneapolis.

» DR. STEFAN ANSBACHER has resigned from the research division of Borden Co., New York, to join the research staff of E. R. Squibb & Sons.

» JOHN H. BAILEY now heads up the National Milling branch of National Biscuit Co., which is at Toledo. Formerly flour buyer for National Biscuit at New York, Mr. Bailey succeeds Harold Anderson, who resigned to go into business for himself.

» A. L. BOSCH has been named superintendent of the Ladish-Stoppenbach Malting Co., Jefferson Junction, Wis., to succeed the late Edward Bienfang.

» E. M. BOYCE, for eight years superintendent of the Sunbury, Ohio, plant of Nestlés Milk Products Co., Inc. has been transferred to the company's plant in Lodi, Wis. E. C. Teut succeeds him at Sunbury.

» E. R. BRAUN, JR., Pittsburgh, has been elected president of Pennsylvania Bakers' Assn.

» R. M. CONNER succeeds the late J. M. Stafford as assistant superintendent of Cudahy Packing Co., Chicago.

» HENRY STUDE, president of American Bakers' Association since 1926, will give up his position to go with Purity Bakeries Corp., Chicago, reputedly as vice-president.

» E. M. JOHNSON, an industrial engineer with wide experience in the confectionery field, has taken a position with Pacini Laboratories, Inc., Chicago.

» J. H. MARTSOLF has been appointed general production manager of Tea Garden Products Co., San Francisco. He had been production engineer with the company.

» ROBERT L. MORAN has succeeded the late Nathan Kahn as a director and first vice-president of E. Kahn's Sons Co., Cincinnati. He has been with the company since 1920.

» LOUIS C. PELLS, New England sales representative of Charles E. Hires Co., will have general supervision of the company's new branch bottling plant at Somerville, Mass.

» WALTER C. PRESSING has been appointed production manager of five plants of Fairmont (Minn.) Packing Co. He had been with Stoops Packing Co., Van Wert, Ohio.

» GEORGE RECTOR, noted food authority, lecturer and author, has joined Phillips Packing Co., Cambridge, Md., as master chef.

» ANDREW ROSS, who was the first president of Associated Grocery Manufacturers of America, has been appointed to the newly created position of executive vice-president of the Association.

» FRED SCHWARZE, formerly in charge of cocoa-bean roasting, milling and pressing with Rockwood & Co., Brooklyn, N. Y., is now with Walter Baker & Co., Inc., Dorchester, Mass., doing work along the same line.

» J. M. SEAMAN, Mt. Vernon, Wash., recently was elected president of Northwest Canners' Association.

» WILFRED W. SHERMAN has been retired on pension by Swift & Co., Chicago, after having served the company since 1893. He had been assistant treasurer since 1909 and was an officer and director of some 30 associated companies.

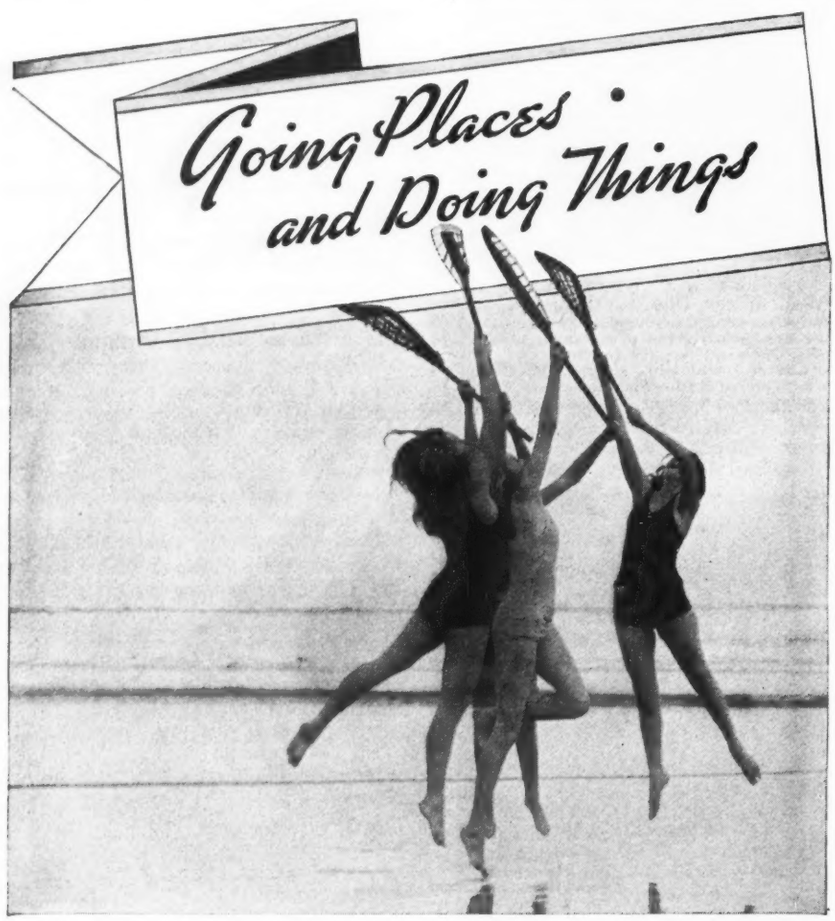
» RALPH O. DULANY, Fruitland, Md., was elected president of National Canners' Association at the Chicago convention.

» DR. ALONZO E. TAYLOR has become chairman of the research committee of General Mills, Inc., Minneapolis. Dr. Taylor worked for the government during the war surveying and reporting on food conditions in Europe. He was also a member of the War Trade Board. In 1921, he became director of Food Research Institute and in 1927 was a delegate at the International Economic Conference in Geneva. Later he was attached to the American delegation to the International Wheat Conference.

» ENOS TAYLOR, Guyan Creamery Co., Huntington, is the new president of West Virginia Dairymen and Ice Cream Manufacturers' Association.

» E. C. THATCHER, Degraff, has been elected president of the Ohio Canners' Association.

» R. P. WILSON has resigned as manager of Burlington (Wis.) Pure Milk Co. to purchase Cloverleaf Dairy, Lake Geneva, Wis.



● Service Push E-Z Trucks are built for top-speed, "up-on-your-toes" performance. They never get caught flat-footed. Wheeling along with the effortless ease of a Duesenberg doin' eighty . . . swooping through narrow aisles, and swerving around obstructions like a bird on the wing . . . Push E-Z's get hauling jobs done in record time, lighten labor, and cut hauling costs. Timken thrust bearings, hard, steel ball-bearings in machined races, and Hyatt roller bearings divide the most crushing loads . . . dissipate shocks . . . eliminate friction . . . keep down maintenance costs.

You'll find it profitable to get full details on the time-saving, cost-lowering performance of Service Push E-Z Trucks and sturdy, frictionless Service Casters. Write today.

THE SERVICE CASTER & TRUCK CO.
525 N. Brownswood Ave. Albion, Michigan

» THOMAS E. WILSON, chairman of the board of Wilson & Co., Chicago, has been elected first vice-president of National Association of Manufacturers.

Deaths

» GERHARD H. BERLING, 70, president of Berling Dairy Products Co., Cincinnati, recently.

» EDWARD E. BIENFANG, 51, superintendent of Ladish-Stoppenbach Malting Co., Jefferson Junction, Wis., Dec. 22.

» WALTER O. BIRK, 53, president, treasurer and general manager of Walter Birk Candy Co., Chicago, Jan. 6.

» WILLIAM J. CONDON, 53, president of Condon Baking Co., Charleston, S. C., recently.

» LOUIS GALLIKER, 59, president and general manager of Galliker Ice Cream Co., Johnstown, Pa., Jan. 3.

» JOHN H. HOLMAN, 79, founder and president of Bonita Candy Co., Fond du Lac, Wis., Jan. 13.

» WILLIAM P. LISTON, 72, for 38 years superintendent of North Packing Co., Boston, Jan. 11. He retired eight years ago.

» LOUIS OZERSKY, 63, head of Ozersky Baking Co., Youngstown, Ohio, Jan. 11.

» EDGAR J. PICKERING, 82, formerly superintendent of Northwestern Consolidated Milling Co., Minneapolis, Dec. 25. He had been retired six years.

» GEORGE A. SCHIFFLER, 63, founder and former president of Schiffler Biscuit Co., now Quality Biscuit Co., Milwaukee, Jan. 2.

» ADOLPHE E. SMYLIE, 76, retired president of National Licorice Co., Brooklyn, N. Y., Jan. 7.

Associated Industries

» AMERICAN CAN CO. will construct a $1,500,000 plant at Houston, Texas, to manufacture a general line of containers.

» BORG-WARNER CORP. will manufacture "Tuc" corn canning equipment in its Rockford (Ill.) Drilling Machine division. This equipment formerly was made by Fay & Scott, Dexter, Me.

» VICTOR BUHR, specialist in the design and construction of food plants, has been appointed vice-president of O'Driscoll & Grove, Inc., New York.

» CELLULOID CORP., New York, has promoted E. W. Ward to assistant general sales manager. D. S. Hopping succeeds Mr. Ward as director of sales of the packaging division.

» J. L. FERGUSON CO. has employed J. H. Sprenger as sales representative in Texas and Oklahoma.

» FOSTER WHEELER CORP., New York, has appointed W. L. Martwick general sales manager.

» H. B. FULLER CO., St. Paul, has acquired a new and larger plant to take care of increased business. The company is celebrating its 50th anniversary.

» ROBERT GAIR CO., Inc., has acquired the business, equipment and inventory of Pa Pro Co., Utica, N. Y., and Holyoke (Mass.) Fibre Box Co., Inc.

» GLASCOTE PRODUCTS, INC., Cleveland, has taken over the plant, patents and good will of Glascote Co.

» METAL GLASS PRODUCTS CO. has opened a sales and distribution office and showroom in New York.

» PATTERSON FOUNDRY & MACHINE CO., Philadelphia, has appointed George L. Anderson sales engineer. Mr. Anderson is connected with the company's Philadelphia office.

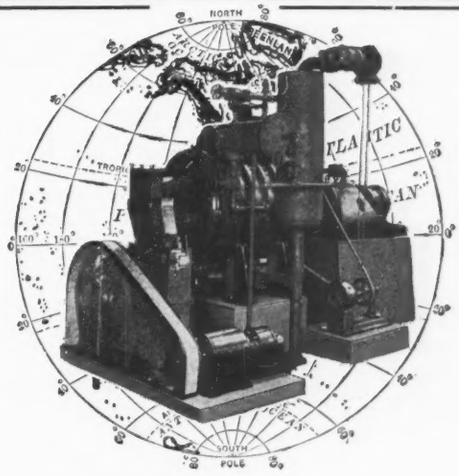
PAKICE...

MEANS THE

WORLD

TO THE

FOOD INDUSTRIES



Wherever product icing or product cooling is a factor in production or marketing, the advantages of PakIce are amazing.

DON'T MISS THIS

The extravagance of old crushed-ice methods is fast giving way to the economy and convenience of PakIce throughout the food industry, for PakIce not only provides more effective protection for the product, but effects a sound and substantial saving in the burden of cost.

PakIce can be made on the premises when and as needed with a Vilter PakIce Machine. Requires very little space and comparatively small investment. PakIce is produced in either briquette or crystal form—the most practical form for product or bunker icing or for product cooling. It is clean, crisp and cold. May be stored for use as needed, without noticeable shrinkage loss.

Investigate PakIce now.

THE VILTER MANUFACTURING COMPANY
"SINCE 1867"
2115 South First St.
MILWAUKEE, WISCONSIN
Representatives in Principal Cities

Crystallizing

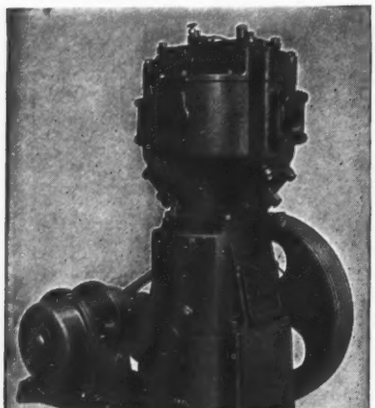
(*Continued from page 73*)

placed on the goods also has a marked effect; hot syrups produce a large sized crystal. The length of time that the syrup is on the goods also affects the crystal coating. This may vary from four to twelve hours depending on the cook, temperature of syrup and the manufacturer's desire. Agitation and stirring of the cooled syrup should be avoided. It may start premature crystallization. I know of a manufacturer who was compelled to pump his hot syrup but I advise against this. A vibrating building is a poor place to produce good crystallized candy as the crystals may form on the confection in a loosely attached manner.

When the goods are placed in the pans or baskets they should be dry and free from starch and a sugar rolled gum piece should be thoroughly dried before it is crystallized. All apparatus such as valves, pipe lines, dippers, pans, baskets, and the like, should be thoroughly cleaned before any syrup comes in contact with them. Such precautions are for both sanitary and quality control purposes. When the candies are taken from the syrup they should not be pushed about or roughly handled, as this treatment will break the coating or dull the crystal. A broken or imperfect coverage is the surest way of making poor crystallized confections.

Syrups are occasionally colored when they are to be used on colored centers. The disposal of spent syrups, whether colored or not, need cause no inconvenience. If not colored, they make good raw material for fondant. If colored they may be used for gum drops of the same color, or mixed into black goods.

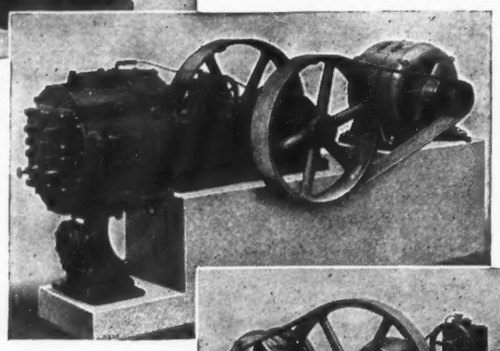
Emphasis is placed on the importance of using only pure, "strong" sugar for crystallizing work. By "strength" is meant that quality in sugar which enables it to withstand elevated temperatures with the least amount of inversion. "Strength" bears an intimate relation to what the chemist calls hydrogen-ion concentration, which is the measure of whether a substance is alkaline, neutral or acid, and, if either alkaline or acid, to what degree. There are other factors, however, that affect the strength of sugar. One of these is the presence of even a minute quantity of impurities in the form of colloidal matter. A colloidal substance is one which does not form a perfect solution, examples are soap and glue. Raw sugar contains an appreciable quantity of colloids and, if it is not thoroughly processed in the refinery, some of these will pass into the refined sugar. Because of the danger of injurious effects from even very small quantities of impurities, the wise candy maker will purchase pure "strong" sugars for crystallizing.



WORTHINGTON VACUUM PUMPS for EVERY VACUUM REQUIREMENT

Vertical Single and Two-Stage Units

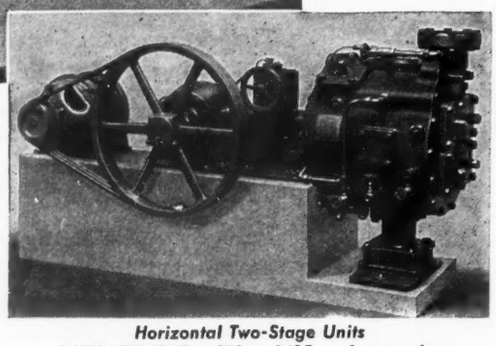
DISPLACEMENTS
S-St.—to 250 c.f.m.
2-St.—to 138 c.f.m.



Horizontal Single-Stage Units

DISPLACEMENT
354 to 2832 c.f.m.

Horizontal units arranged for motor-belt or steam drive



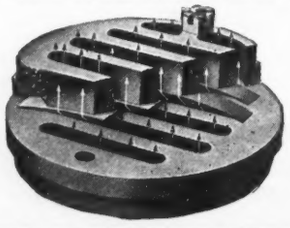
Horizontal Two-Stage Units
DISPLACEMENT—178 to 1425 cu. ft. per min.

THESE units will produce and maintain the required vacuum with a minimum expenditure of power.

The two-stage machines are for use where higher vacuum is desired.

Worthington has the correct unit for best performance for every condition.

Equipped with
THE WORTHINGTON FEATHER VALVE



. . . . . the most efficient and practical valve yet devised for vacuum service.

VP7-1

WORTHINGTON PUMP AND MACHINERY CORPORATION
General Offices
HARRISON, NEW JERSEY

Foods Come In

(*Continued from page 69*)

cents a pound. More than 1,000,000 lb. of cherries were imported at a tariff rate of 2 cents a pound.

While at first glance it may appear that these statistics indicate enormous imports of fruits and vegetables, the fact is that with the exception of some fruits and vegetables not indigenous to the soil of this country, they represent only a drop in the bucket as compared with national production and consumption of the same items. Furthermore, they do not take into account the quantity of exports.

How Armour Handles . . .

(*Continued from page 67*)

Another new beef-house materials handling mechanism is used to convey chilled oleo fat from the offal floor to hashers located in another building. This is a smooth stainless-steel belt about 190 ft. long and inclined at an angle of approximately 15 deg. from the horizontal.

Extensive use of power tractors is made in the beef house for moving trucks from one department to another. Some of these are storage-battery units, but those for the heavier hauling are powered with gasoline engines. To facilitate movement of the trucks about the plant, all doors through which large amounts of material is handled are opened and closed by electric motors. Pull ropes enable the tractor operator to open and close a door without dismounting from his machine.

Pressure Processing

(*Continued from page 76*)

for scientific exploration is being opened up. The advantage to bakers and ice cream makers formerly found in superheated evaporated milk has been found present in greater degree in pressure-processed evaporated milk *and without the increased viscosity so characteristic of superheated evaporated milk.* The emulsifying possibilities of pressure processing are indicated by the fact that cream reconstituted from unsalted, unripened butter and fresh skim milk not only retained the inherent physical characteristics of sweet cream *but did not feather in coffee although it did churn into butter without an inordinate fat loss.*

An important incidental result obtained in pressure processing is the deodorizing effect. This, however, can prove to be a disadvantage, particularly if not controlled, when processing a dairy liquid possessed of fine, delicate characteristic flavors and odors. Nevertheless, it is the universal experience of every diaryman and dairy products manufacturer to encounter milk and cream during certain seasons tainted with weedy flavors.

Under such circumstances, an extensive deodorization is beneficial although it is necessary to restore characteristic flavor and aroma by proper ripening of the treated dairy liquid with cultures of bacteria that naturally occur in milk.

Pressure processing is a new field to be explored in its application to dairy products and probably other food products as well. In presenting its salient features, it is hoped that it will encourage further exploration leading to new discoveries for other applications.

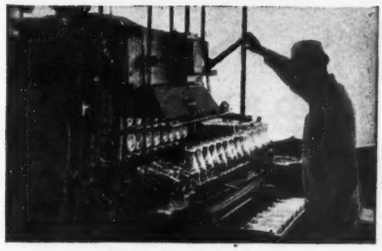
Better Quality Control

(*Continued from page 77*)

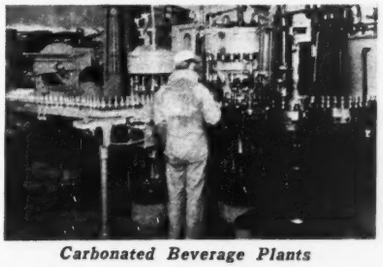
Among the subjects which the laboratory is particularly fitted to investigate are the nature of raw ingredients, the efficiency of the plant layout, defects in syrup making processes or in water treatment equipment, the character and concentration of washing compounds being employed, the testing and adjustment or correction of pressure, the nature and character of any sediments that may exist in the product, the alkalinity of water and the effectiveness of the means employed for alkalinity correction, the relative amount of foreign matter in syrups and the efficiency of syrup filtration apparatus, and, finally, the illumination intensity at various points in the plant.

OAKITE *Cleaning assures* FILM-FREE *Bottles!*

TRADE MARK REG. U.S. PAT. OFF.



Milk Bottling Plants



Carbonated Beverage Plants

Water Bottling Plants

Do you bottle

MILK?

SOFT DRINKS?

BEER? WATER?

Are you getting clean, film-free sparkling bottles day-in and day-out? You can . . . if you use dependable Oakite cleaning and sterilizing materials.

Flavor . . . quality . . . goodness . . . purity, depend so much on absolute cleanliness of bottles and equipment that today, food plant executives have a greater appreciation of the IMPORTANCE of selecting the CORRECT cleaning and sterilizing materials to assure the standards they desire to maintain for their products.

It is the reason, too, why so many are specifying free-rinsing, fast-acting Oakite materials because back of these materials are 28 years' of successful experience . . . years of continuing research that can be counted on to help you meet every bottle washing requirement. Find out what these economical, safe materials can do for you by writing us today.

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SPECIALIZED INDUSTRIAL CLEANING MATERIALS & METHODS

BOOKS RECEIVED

FEDERAL INCOME TAX HANDBOOK 1936-37. By Robert H. Montgomery. Published by Ronald Press Co., 15 East 26th St., New York, N. Y., 1936. 1222 pp. 6¼x8¾ in.; cloth. Price $10.

Prepared by an authority on tax problems, this exhaustive study and interpretation of the Federal Income Tax law combines both the legal and accounting aspects of corporation income taxes, individual income taxes, capital stock tax, excess profits tax, undistributed profits tax, "windfall" tax and other miscellaneous taxes which make the Revenue Act of 1936 so different from previous new tax laws.

All corporation executives will find it an invaluable guide in deciding questions of financial and accounting policy. In the absence of court decisions and ruling the author gives his personal recommendations on the best procedure to follow on ambiguous and disputed points.

FEDERAL TAX LAW. Published by Prentice-Hall, Inc., 70 Fifth Ave., New York, N. Y. 1936. 156 pp., 6x9¼ in.; paper. Price, $1.

Containing a well indexed explanatory digest of the Revenue Act of 1936 this handy sized manual deals with the federal tax law as it now is. The Income Tax law is given in full with an explanation of who must make a return, what the tax rates are, how the tax is computed and what exemptions, deductions, and credits are allowed.

Other federal taxes of interest to food manufacturers are: Capital stock, excess profits, and export. Closely related subjects are tax refunds and floor stocks adjustment under A.A.A. All of them are discussed briefly.

LEGAL ASPECTS OF MILK CONTROL. By James A. Tobey. Published by International Association of Milk Dealers, Chicago, Ill., 1936. 102 pp., 6¼x9¼ in. cloth. Price, $3.

Production, processing, and merchandising of milk and dairy products are so closely tied up with public health that numerous federal, state and local laws have been made controlling the industry. In this book an attempt is made to make the substance of these laws understandable to every one connected with the dairy industry in an executive, advisory, or inspecting capacity. It is not intended as a substitute for an attorney in the interpretation of the laws but as a guide as to what the constitutional, administrative, public, and private laws provide for as they apply to the dairy industry and its products.

HOW TO PREVENT SPOILAGE IN THE FOOD STORE. By Alexander Todoroff. Published by Grocery Trade Publishing House, 755 No. Central Ave., Chicago, Ill., 1936. 48 pp., 5x7⅞ in., paper, illustrated. Price 50 cents.

Care of foods by the grocer has its counterpart in the factory to prevent spoilage of raw materal or lunch room supplies. Correct methods of caring for the perishable and semi-perishable foods and food accessories are the result of extensive research work. Manufacturers of foods as well as the merchants should know these methods and the results that may be obtained by using them. Many of them are given in this book.

REFERENCE BOOK OF THE MEAT PACKING INDUSTRY. Published by Institute of American Meat Packers, 59 East Van Buren St., Chicago, Ill., 1936. 56 pp., 5x7⅞ in., paper, illustrated. Free.

Latest available data and knowledge about the meat packing industry and its products are presented in this booklet. Also included are charts illustrating and naming each standard cut of the four most consumed meats: beef, pork, veal, and lamb.

PATENTS

Lecithin Mixed With a Di-glyceride of Higher Fatty Acid to Form Dry Mixture Readily Dispersible in Water—Albert K. Epstein and Benjamin R. Harris, Chicago, Ill. No. 2,062,782. Dec. 1, 1936.

Crude Fatty Acid Mixtures Heated to About 150 Deg. C. in Presence of Hydrogen Gas Prior to Distillation for Preparation of Color Stable Fatty Acids—Madison L. Sheeley, Des Plaines, Ill. to Armour & Co., Chicago, Ill. No. 2,062,837. Dec. 1, 1936.

Candies Decorated With Thin Edible Decorations While Tumbling in a Revolving Pan—Horace B. Cosler, Evanston, Ill. to National Candy Co., Inc., St. Louis, Mo. No. 2,062,867. Dec. 1, 1936.

Citrus Fruits Dyed With Oil-Soluble, Water-Insoluble Dye by Application of Dye Composition Consisting Largely of Water—James Otis Handy, Larchmont, N. Y. No. 2,062,903. Dec. 1, 1936.

Dry Pectin Preparations Made From Pectin and Practically Neutral and Inert Substances Which Yield Edible Organic Acids Upon Heating in Jelly Batch—Willard E. Baier, Ontario, Calif. to California Fruit Growers Exchange, Los Angeles, Calif. No. 2,063,143. Dec. 8, 1936.

Sugar Juice Boiled to Crystallization Under Vacuum With Controlling Device for Maintaining Desired Boiling Condition—Hermanus Andreus Ditmar, Janssen Djokjakarta, Java, D.E.I. No. 2,063,166. Dec. 8, 1936.

Alcoholic Fermentation of Sugar-Containing Liquids Maintained by Controlling Concentration of Yeast Present in Relation to Amount of Fermentable Sugar in Solution—Firmin Boinot, Melle, Deux-Sevres, France. No. 2,063,223. Dec. 8, 1936.

Deterioration of Vacuum Packed Roasted and Ground Coffee Registered by a Calibrated and Retarded Chemically-Reactive Detector of Oxygen Sealed in Package—Kurt W. Haeseler, Forest Hills, N. Y. to Foster D. Snell, Inc., Brooklyn, N. Y. No. 2,063,245 Dec. 8, 1936.

Fats and Oils Stabilized Against Deterioration by Incorporation of a Sugar Amine Compound—James K. Hunt and George H. Latham to E. I. duPont de Nemours & Co., Inc., Wilmington, Del. No. 2,063,602. Dec. 8, 1936.

Citrus Fruits Ripened by Contact With Unsaturated Hydrocarbon Gas in Concentration Greater Than One Part in 10,000 of Air—Helen Rea Rutledge, Rockford, Ill. No. 2,063,628. Dec. 8, 1936.

Flour and Similar Materials Transported in Bulk Containers Which Discharge Under Higher Than Atmospheric Head Pressure—Graham C. Woodruff, Bronxville, N. Y. to L. C. L. Corp. No. 2,063,652. Dec. 8, 1936.

Beer Transported in Bulk in Plurality of Cylindrical Tanks Mounted Vertically on Truck Platform and Equipped With Beer Manifold, Valve and Pipes and Hose for Emptying—Augustine Davis, Jr., Cincinnati, Ohio. No. 2,063,727. Dec. 8, 1936.

Milk and Milk Preparations Made More Digestible by the Addition of an Alkali-Metal Metaphosphate—Ralph E. Hall, Mt. Lebanon, Pa. to Hall Laboratories, Inc., Pittsburgh, Pa. No. 2,064,110. Dec. 15, 1936.

Sugar Juices Limed and Carbonated in a Continuous Manner by a Circulatory Movement of the Juices in the Presence of the Reagent in an Upwardly and Downwardly Directed Stream—Raymond M. White, Denver, Colo. No. 2,064,135. Dec. 15, 1936.

Cocoa Beans Broken Into Coarse Grain Pieces, Saturated with Sugar Solution and Dried for Roasting—Albert Diefenbach, Arlesheim, Switzerland. No. 2,064,524. Dec. 15, 1936.

Rice Flakes Made by Heating Rice Grains Between 165 and 265 Deg. F. for 30 Min. in Steam Saturated Atmosphere and Compressing When Moisture Content is About 20 Per Cent—Einar O. Stokkebye, Goteborg, Sweden. No. 2,064,701. Dec. 15, 1936.

Bread Doughs Made in a Mixer Having a Rotating Kneading Element With a Rotating Rate Twice That of the Mixing Agitator—William G. Kirchhoff, to J. H. Day Co., Cincinnati, Ohio. No. 2,064,758. Dec. 15, 1936.

Nuts Blanched Mechanically by Rotatable Action of a Plural Number of Parallel Spiral Cutters—Eugene A. Rebeghini, Chicago, Ill. No. 2,065,093. Dec. 22, 1936.

Cheese Packaged in Transparent Cellulose Having Moisture-Resisting Properties—Benjamin R. Harris to Kraft-Phenix Cheese Corp., Chicago, Ill. No. 2,065,182. Dec. 22, 1936.

Cheese Ripened and Processed with a Minor Constituent of a Soluble Salt of an Aliphatic Acid Which Resembles Sugar in Chemical Structure and is Anti-acid to the Acidity of Cheese Prior to Processing—Benjamin R. Harris to Kraft-Phenix Cheese Corp., Chicago, Ill. No. 2,065,183. Dec. 22, 1936.

Fruit Juices Extracted on Revolving Reamer Type Machine with Mechanical Feeding—Norval M. Faulds, Clearwater, Fla. No. 2,065,271. Dec. 22, 1936.

Starch Recovered From "Fine Slop" Separations by Treatment in a Settling Vessel—Frederick L. Jefferies, LaGrange, Ill. to International Patent Development Co., Wilmington, Del. No. 2,065,313. Dec. 22, 1936.

Food Flavoring Products Prepared by Adding Edible Salts to Yeast to Get Partial Plasmolysis and Toasting at a Temperature of 140 to 210 Deg. C.—George W. Kirby, Bronx, and Charles N. Frey, Scarsdale, N. Y. to Standard Brands, Inc., New York, N. Y. No. 2,065,332. Dec. 22, 1936.

Egg Meats Defibrinized by Forcing Under Pressures Greater Than Atmospheric to and Through a Large Area Filter of Porous Material—William L. Lomax, Chicago, Ill.; Frank D. Lomax, administrator of deceased William L. Lomax. No. 2,065,384. Dec. 22, 1936.

Ice Cream Made with Small Percentage of an Ester of Polyhydric Alcohol and a Higher Fatty Acid Having One or More Free Alcoholic Hydroxyl Group—Warren D. Roth, Leo C. Brown and Guy W. Phelps, to Industrial Patents Corp., Chicago, Ill. No. 2,065,398. Dec. 22, 1936.

Coffee Beans Freed of Strings and Similar Foreign Material by Action of Downwardly Inclined Rolls Supplemented by Upwardly Directed Currents of Air—Eugene G. Berry, Indianapolis, Ind. to B. F. Gump Co., Chicago, Ill. No. 2,065,557. Dec. 29, 1936.

MIXING...
A Unit Operation Seldom Discussed But Widely Used

A UNIT OPERATION IN FOOD ENGINEERING

Mixing

▶Few, if any, unit operations find wider use in food manufacturing. In its simple form it is known as agitating or stirring. In other applications it is identified as beating, blending, diffusing, dispersing, emulsifying, homogenizing, kneading, whipping or working. It includes mixing of liquids with liquids, mixing of liquids with solids, and mixing of solids with solids.

This is No. 9 of a series on the unit operations of food engineering.

PART II

MIXING AS A UNIT OPERATION in food engineering has so many phases that a clean cut definition seems impossible. In Part I of this discussion (FOOD INDUSTRIES, December 1936, p. 655) was outlined some of the factors which have to be considered in connection with mixing and with selecting a means by which mixing may be accomplished.

With a certain amount of definiteness we can say that mixing is used to bring about a uniform physical distribution of two or more components throughout a mixture. The components may be liquids, solids and liquids, or solids. Also, we can be specific to the extent of saying that mixing has at least one of four objectives. They are: 1. To obtain a physical mixture of two or more components which do not ordinarily separate when once mixed; 2. To produce a non-settling or non-separating mixture of two or more components which ordinarily separate into layers or strata if not kept in constant motion; 3. To produce a physical change; 4. To speed up reaction.

The mechanical means by which these results are obtained may be designated as mixers. In Part I were listed the following classes of mixers which have been designed and used to give one or more of the four results sought through mixing. Design is the basis of the classification which is (*a*) tumblers, (*b*) paddles, (*c*) propellers, (*d*) turbines, (*e*) spirals, (*f*) jets or sprays, and (*g*) miscellaneous or special.

Which of these classes includes the mixer desired to do a certain job is a question largely answered by taking into account the following factors:

1. Is the mixture liquid, dry, or a paste?
   (*a*) Is it fluid or viscous?
   (*b*) Is it granular or powdery?
   (*c*) Is it plastic or gummy?
2. Will the components mix easily?
   (*a*) Do they have the same specific gravity?
   (*b*) Do they have the same particle size?
   (*c*) Are the solids easily wetted or dissolved by the liquids?
   (*d*) Do the liquids mix well with each other?
   (*e*) Does heat or refrigeration have to be applied?
   (*f*) Does the viscosity or fluidity of the mixture change during mixing?
3. In what proportions do the components make up the mixture?
4. In what order is each component added to the mixture and what is the effect if the order of addition is changed?
5. Is the operation a batch or a continuous one?
6. Is the mixture a final product or an intermediate raw material?

While these factors may not be all which should be considered before deciding which mixer is the one needed, they do cover points which should be given serious thought. In fact the latest method of approach to the solution of a mixing problem is the answering of these and other questions through research laboratory study before any mixer is decided upon. Quite frequently a mixer of special design or unusual added features is needed for the specific job.

The mixers referred to or illustrated in our discussion of this subject do not include all that are available as standard mixers. They are among those best known and illustrate types which are likely to be obtainable from more than one manufacturer. In this Part II attention is given to mixers used to make and condition plastic doughs and pastes and to make emulsions and dispersions. These mixers include reel and arm or blade mixers, emulsifiers, colloid mills and homogenizers.

Emulsifiers, colloid mills and homogenizers come under (*g*) the miscellaneous or special class of mixers. They are mixers to the extent that they produce a non-settling or non-separating mixture of two or more components which usually separate into layers or strata if not kept in constant motion.

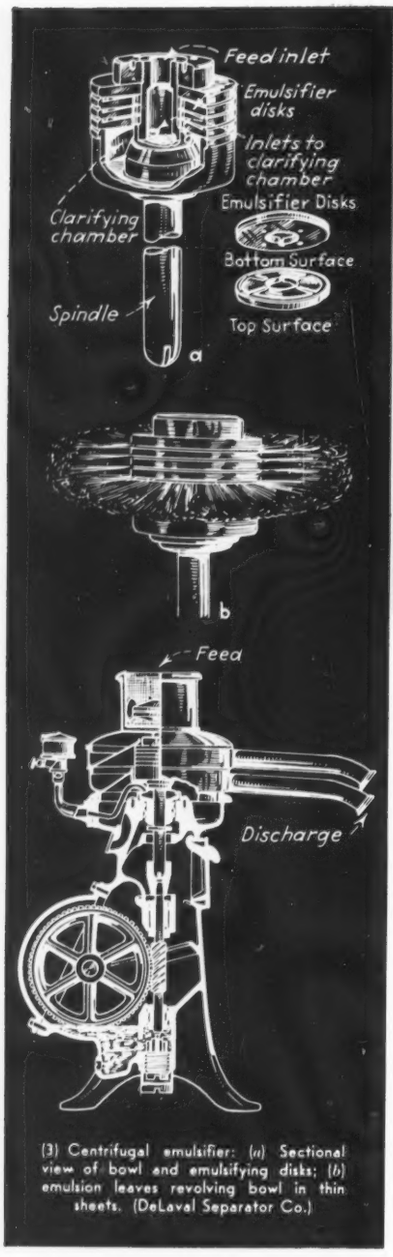
In them the mixing action is accomplished largely through dispersion, a scattering of the globules or particles of the components. This dispersion may be in the nature of an emulsion or a suspension. It is commonly known as an emulsion when the components are liquids and a suspension when one of the components is a solid.

In an emulsion one of the non-mixing liquids is beaten, whipped, or ground into droplets or globules and scattered throughout the bulk of the second liquid. In a suspension the solid is beaten or ground into fine particles and scattered throughout the liquid.

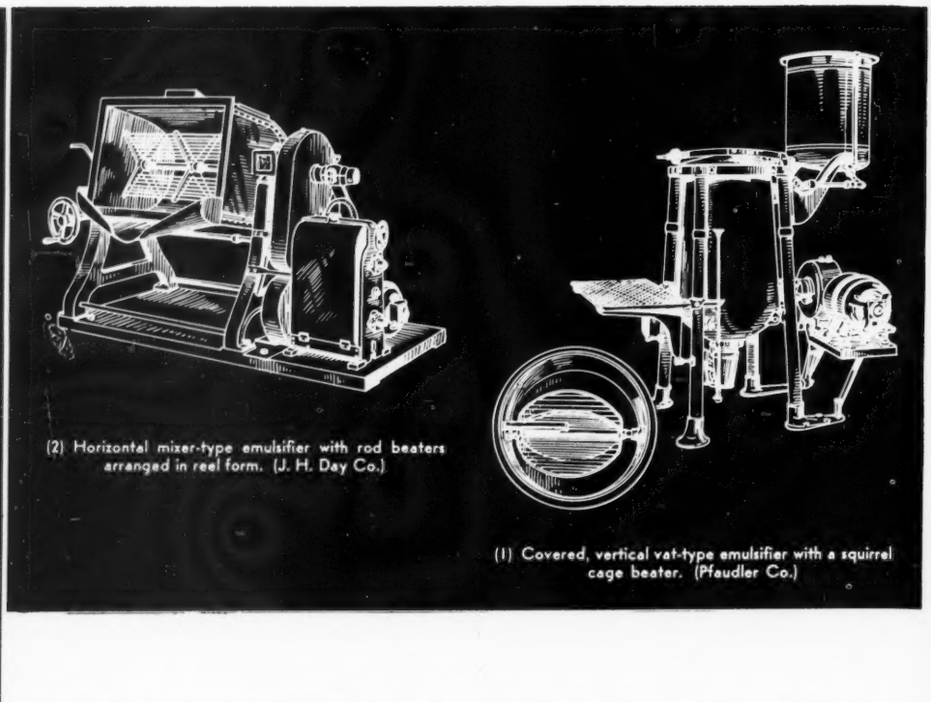
IN SUCH MIXTURES the component which is scattered as droplets, globules, or fine particles is known as the "dispersed phase" of the emulsion or suspension. The other component is termed the "continuous phase."

These globules or particles are prevented from reuniting and separating from the mixture as a layer or strata through wide dispersion in dilute concentrations or, in greater concentrations, by the addition of a third component known as an emulsifying agent which must be worked into the mixture in a uniform manner. Sometimes this emulsifying agent is soluble in one or both of the other components. Other times it is insoluble in both. Even if soluble in both it is most effective when much more soluble in one liquid than in the other. If insoluble in the second component, it functions best when very finely divided. Such substances as proteins, dextrines, starches, gums, and pectins are among the emulsifying agents used in food emulsions.

These mixtures increase in stability as: 1. The specific gravity of the phases are made to be equal. 2. The globule or particle



(3) Centrifugal emulsifier: (*a*) Sectional view of bowl and emulsifying disks; (*b*) emulsion leaves revolving bowl in thin sheets. (DeLaval Separator Co.)



(2) Horizontal mixer-type emulsifier with rod beaters arranged in reel form. (J. H. Day Co.)

(1) Covered, vertical vat-type emulsifier with a squirrel cage beater. (Pfaudler Co.)

size is decreased, 3. The viscosity of the continuous phase is increased as in whipped cream or mayonnaise, or 4. The continuous phase tends to solidify as in ice cream or marshmallow.

The purpose of emulsifiers, colloid mills, and homogenizers is to bring about the distribution of the dispersed phase in such a way as to keep it in a dispersed state. In Part I of this discussion on mixers (FOOD INDUSTRIES, December 1936, pp. 655 to 662) are illustrated types of paddle, propeller, turbine, tumbling and spiral ribbon mixers which may be used for such purpose. More applicable are the ones shown in Figs. 1 to 18 of this, Part II, of the discussion.

Units shown in Figs. 1 and 2 produce the emulsion simply by the whipping action of their beater type agitators. They require no premixing of the components and find use in the making of mayonnaise, salad or sandwich dressings, whipped eggs and the like.

More intricate in construction and more vigorous in its action is the centrifugal emulsifier represented by Fig. 3. The liquids to be handled by this unit require premixing. By gravity feed the rough mix enters the rapidly revolving bowl through a central tube from which it is forced out through tangential openings into the clarifying chamber. Here insoluble substances are removed by centrifugal force before the liquid mix flows up through holes in the several revolving plates or disks which constitute the dispersing elements of the machine. Centrifugal action directs the movement of the mixture along channels in these plates or disks and drives it in thin sheets through the small spaces between the outer edge surfaces of the disks. After the mixture comes from between the disks in almost a mist state, it is caught in spouted collectors for discharge into a cooling unit or a bulk container. Machines of this type are designed to emulsify ice cream mixes, liquid, reconstituted or enriched milks and creams, bakery and confectionery ingredients, fountain syrups and similar liquid mixtures.

FIGS. 4 TO 8 ILLUSTRATE dispersing machines which may serve as premixers, as emulsifiers and, to some extent, as disintegrators with or without the exclusion of air. They perform as premixers when rough mixes are passed through them for general dispersion of globules or particles preliminary to homogenization or colloid mill disintegration. As emulsifiers they subject the non-mixing components of a mixture to such vigorous turbulence and particle friction that globules are broken up into smaller ones and emulsifying agents are brought rapidly into solution or worked into the mixture. Although the clearances of the working parts of these machines are relatively open there is a disintegrating action if the globules or solid particles are too large to pass through the clearances without being broken up or ground into smaller globules or particles. The rotating parts of these dispersers are of such design that they serve as centrifugal pumps or turbines to give vigorous turbulence and a forced passage of the mixture between the disintegrating surfaces of the revolving disks or rotors and the stationary parts. Application of these dispersers in the food field is still so much in its infancy that no one knows how widely they may find use. They set up such a vigorous agitation and turbulance that they are capable of producing emulsions with a saving of as much as 50 per cent in emulsifying agent needed. One or more designs of these dispersers have been used with chocolate and cocoa butter mixtures, various syrups, cooking fats and margarin, jellies, dextrin and gum suspensions, and flavor or spice emulsions.

The clearances of the working parts of these dispersers or premixers are too open for the units to be regarded as colloid mills even though a shearing or grinding action may result during their operation. Colloid mills have clearances ranging from 1/50 to 1/2000 in.

In colloid mills (Figs. 9 to 14) and homogenizers (Figs. 15 to 18) we have a very special class of mixers. They are used when extremely fine dispersions are wanted. In many respects they may be regarded solely as disintegrators.

Considered in a broad sense their chief function is to break down solid particles and liquid globules to such a fine state that the particles and globules practically lose their ability to reunite in layers or strata. But when colloid mills and homogenizers, and the results obtained by them, are studied critically they must be classed as highly developed forms of mixers. They accomplish mixing by tearing the globules or particles of the components apart in the presence of each other and by centrifugal

force distribute the small globules or particles so thoroughly throughout the mixture that the components stay in a mixed state even though normally they would quickly separate out unless kept agitated.

The permanence of mixtures made by colloid mills and homogenizers depends largely upon the degree of fineness in size to which the globules and particles of the components are reduced. Such mixtures have greater permanence than the emulsions and suspensions made by previously discussed emulsifiers and dispersers. Also the amount of emulsifying agent used may be greatly reduced, as the liquid globules and solid particles are further reduced in size. These particles and globules are said to take on electric charges as they are made smaller which causes them to repel each other and keep in a constant state of motion. Colloidal particles stay in suspension indefinitely.

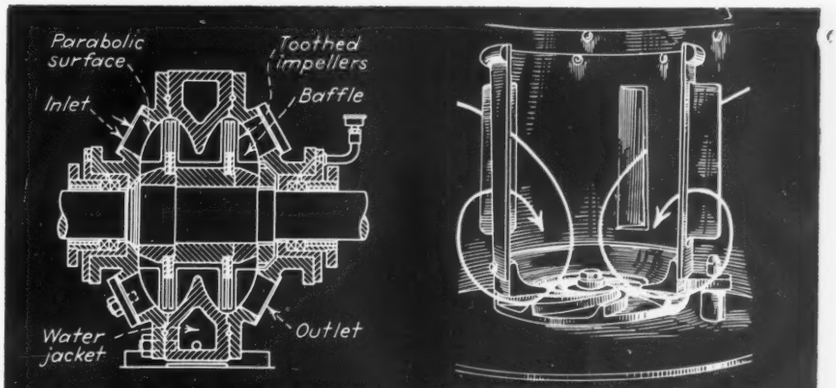
ALTHOUGH COLLOID MILLS differ from homogenizers in several respects they have one factor in common. Both depend upon the disintegrating effects of high velocities to produce the dispersing results.

The most effective disintegrating and mixing results are obtained in colloid mills by means of a surface rotating at a high velocity of 1,000 to 13,000 r.p.m. in close relation—1/500 to 1/1000 in.—to a stationary surface or a surface rotating in opposite direction. On the other hand homogenizing results are obtained by forcing the rough-mixed components under high pressure—150 to 2,500 or more lb. per sq.in.—through extremely small openings. Homogenization is capable of producing a higher degree of dispersion in liquid mixtures than are colloid mills.

Colloid mills may be classed as smooth-surface and rough-surface types. The rough-surface types can operate at slower speeds than can the smooth surface types to give comparable results because the impact and attrition effects are greater. The smooth-surface types depend upon a force of disintegration known as "hydraulic shearing." This force of disintegration is exerted in colloid mill operation because thin layers or films of liquids on both the working surfaces of the mills set up powerful tearing or cutting stresses on the thin layer of liquid between these films. Under the effect of these stresses the globules or particles are made smaller and more thoroughly dispersed throughout the mixture than is the case in emulsifiers and dispersers.

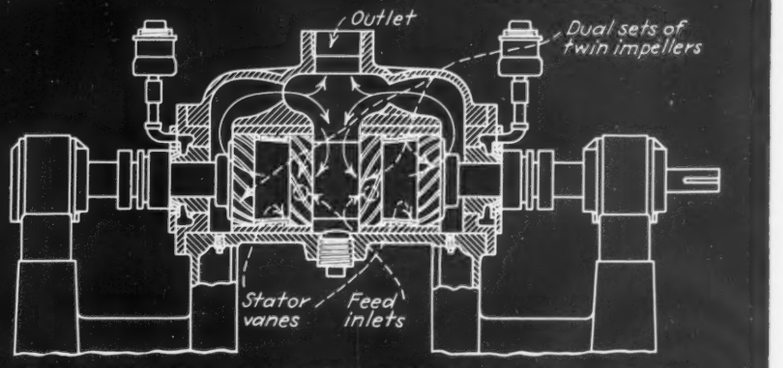
Although colloid mills handle both liquid and paste mixtures, a premixing operation is necessary. If the solid particles in the paste are too large to pass an 80-mesh screen, a pregrinding operation to about 150 mesh is necessary otherwise there will be an unnecessary consumption of power, a needless wear on the working surfaces, and a costly lessening in production. The working surfaces of colloid mills made in the United States consist of (1) smooth or grooved truncated cones rotating with close clearance in smooth or grooved stationary cones; (2) smooth edged plates or disks revolving in a smooth surfaced stator and (3) smooth disks revolving in opposite directions in close relation to each other.

Mills having cone-shaped rotors are fed in a continuous manner by the centrifugal pump action of the rotor or a built in turbine while those having disks or plate type rotors require pressure feeding. Except when specially designed for controlled gas or air intake, the feed of colloid mills prevents the inclusion of air as long as the feed line is kept full with liquids or pastes.

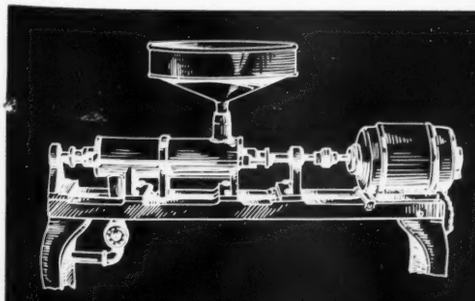


(8) Dispersing mixer with parabolic sides against which two flat, toothed impellers drive the components of the mix. (G. S. de Bethune.)

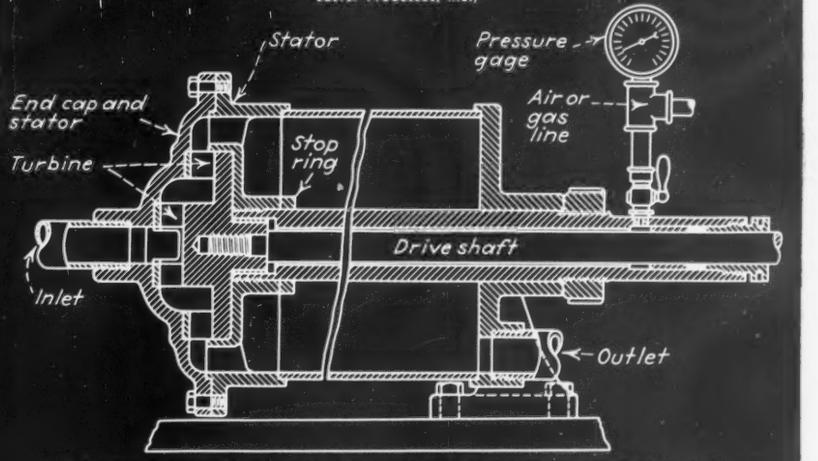
(6) Vaned cylinder mixer or disperser in which bottom mixing disk exerts a centrifugal force to set up turbulence indicated by arrows. (Abbé Engineering Co.)



(7) Horizontal tube disperser having dual sets of twin impellers and stator as well as feed inlets to give high dispersion by shearing with impeller blades and by turbulence. (Lancaster Processes, Inc.)



(4) Simple, horizontal disperser-type mixer using notched perforated disks set at 18 deg. angle on rotating shaft to give vigorous turbulence. (Colloid Equipment Co.)



(5) Horizontal disperser-type mixer with turbine impeller in head and controlled air or gas intake. (Eppenbach, Inc.)

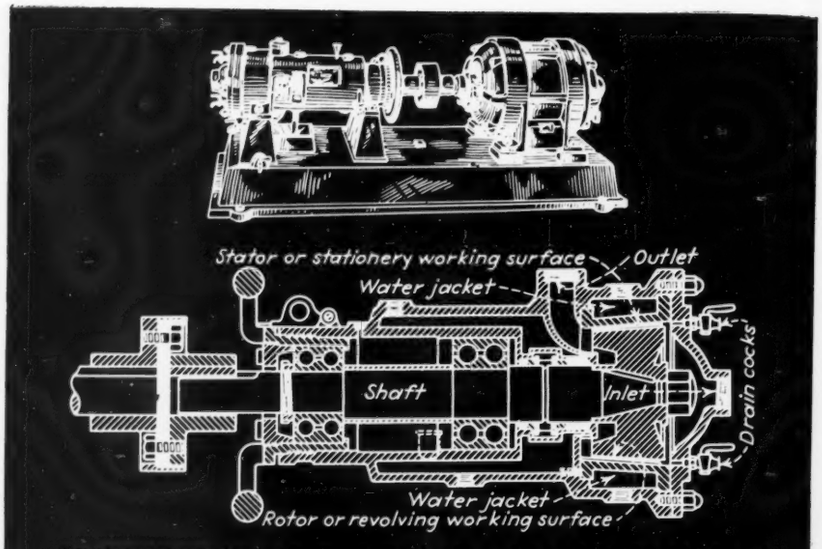
Possibilities of these mills in food manufacture and preparation have not yet been fully determined. Among the uses to which they are now being put are:

1. Manufacture of mayonnaise, salad dressings, mustards, flavor sauces, vitamin emulsions, and bakery emulsions.
2. Preparation of vegetable purees, soup stocks, meat sauces, fish pastes, cheese pastes and chocolate or cocoa pastes.
3. Stabilization of tomato juices, cocktails and catsups, cocoa and chocolate syrups, fruit juice emulsions, flavor emulsions, and chocolate coatings.
4. Emulsification of cheese mixes, ice cream mixes, liquid milks and creams, and regenerated milks and creams from milk powder and butter.

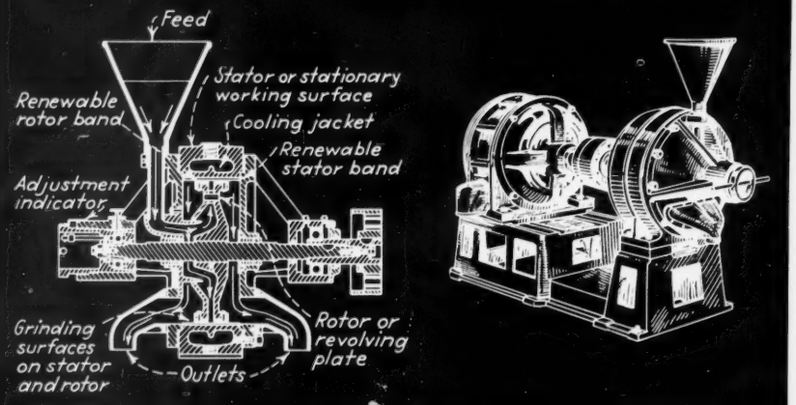
HOMOGENIZERS, as previously intimated, function as positive high-pressure pumps for forcing the roughly mixed liquids or suspensions of relatively small amounts of finely ground solids in liquids through very small openings. Figs. 15 to 18 illustrate the forms in which these homogenizers are commercially available.

When single stage homogenization is used there occurs a thickening of the mixture as well as a breaking down of the globules and finely ground particles. In the case of whipped cream, bakery emulsions, mayonnaise, salad dressings, flavoring emulsions, chiffon custards and icings, coffee creams, and the like such thickening is desirable. For ice cream mixes, liquid milks and creams, cocoa and milk beverages, and similar mixtures which are run over coolers or such products as tomato catsup which are poured from small mouthed bottles this thickening is undesirable. The second stage of two-stage homogenization destroys the clumping of globules which causes the thickening and gives a fully fluid mixture of practically permanent dispersion.

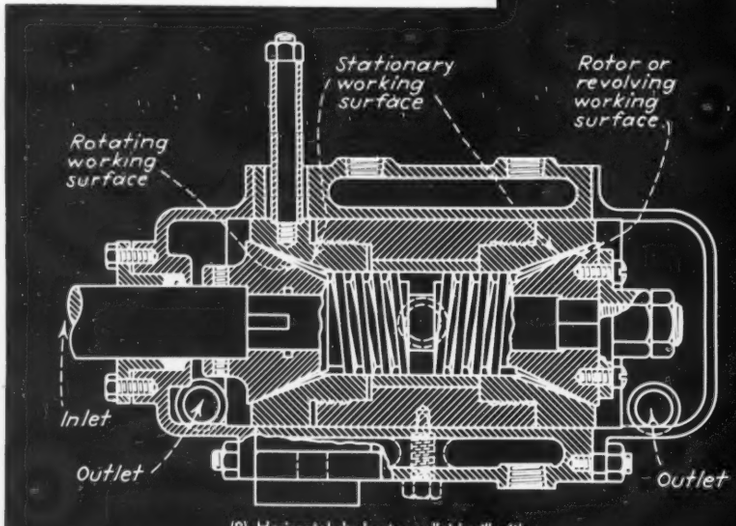
Low pressure two-stage homogenization is obtained by a rotary type positive action pump forcing the liquids under pressure against a cone into a circular groove and through fine slots into a second circular



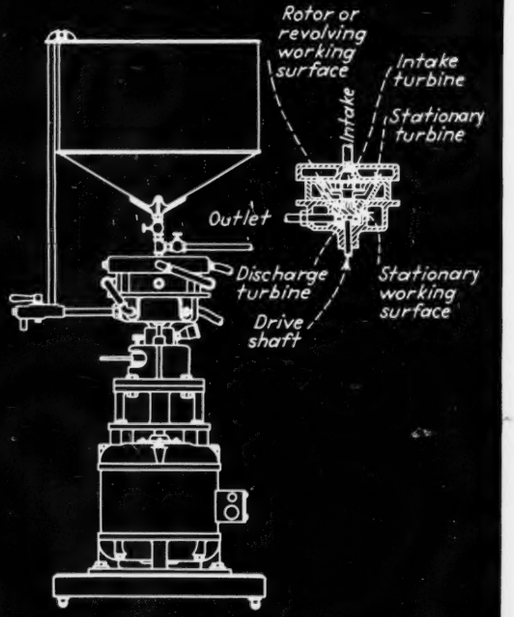
(12) Horizontal colloid mill with grooved conical working surfaces on both rotor and stator and internal centrifugal pump device on feed end of rotor. (Chemicolloid Laboratories, Inc.)



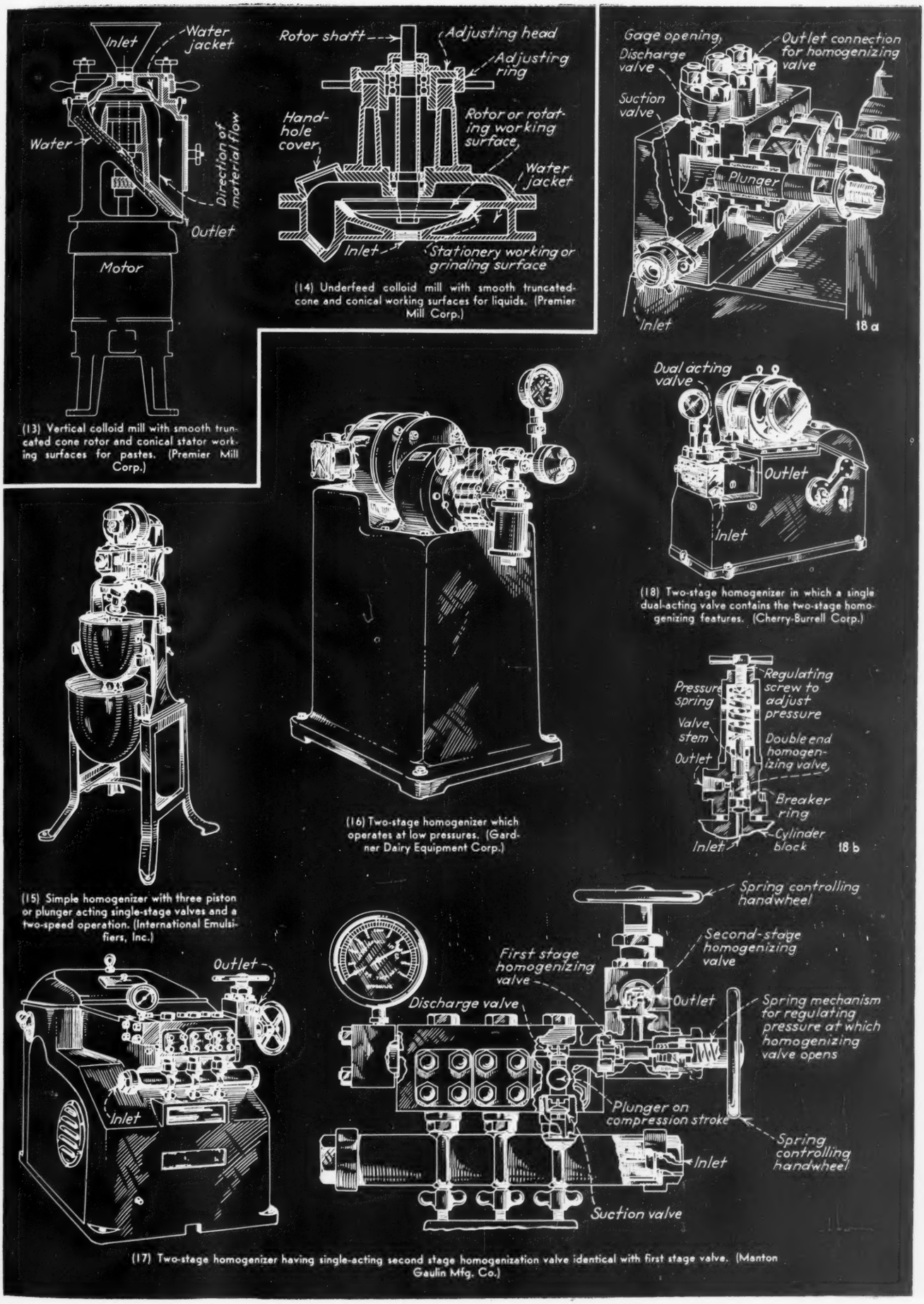
(11) Revolving plate-type colloid mill with smooth working surfaces on outer rim of plate and inner wall stator of mill. (J. H. Day Co.)



(9) Horizontal dual rotor colloid mill with rotor and stator working surfaces finely grooved. (Eppenbach, Inc.)



(10) Vertical colloid mill with turbine intake and discharge, rotor and stator surfaces finely grooved. (Eppenbach, Inc.)



(13) Vertical colloid mill with smooth truncated cone rotor and conical stator working surfaces for pastes. (Premier Mill Corp.)

(14) Underfeed colloid mill with smooth truncated-cone and conical working surfaces for liquids. (Premier Mill Corp.)

(15) Simple homogenizer with three piston or plunger acting single-stage valves and a two-speed operation. (International Emulsifiers, Inc.)

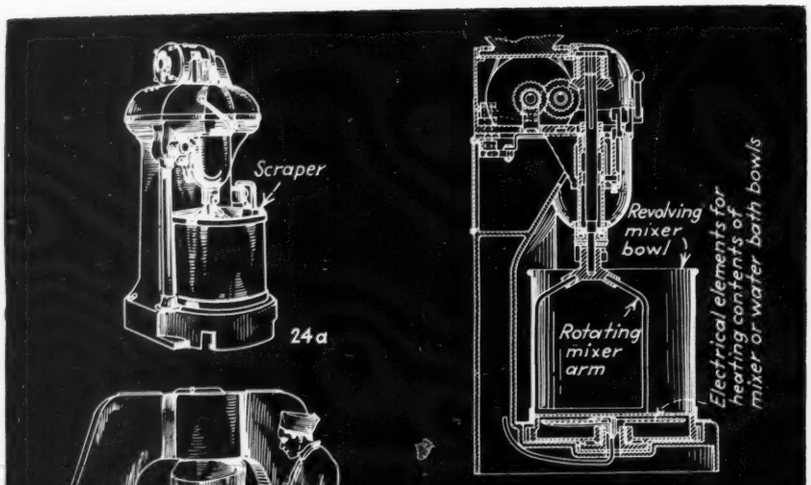
(16) Two-stage homogenizer which operates at low pressures. (Gardner Dairy Equipment Corp.)

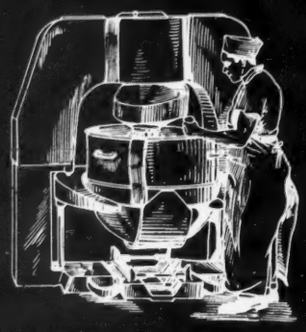
(17) Two-stage homogenizer having single-acting second stage homogenization valve identical with first stage valve. (Manton Gaulin Mfg. Co.)

(18) Two-stage homogenizer in which a single dual-acting valve contains the two-stage homogenizing features. (Cherry-Burrell Corp.)

groove for first-stage homogenization. The second stage consists of the liquid, still under pressure from the second circular groove, being forced through another series of slots and into fixed orifice outlets. Pressures of 150 to 550 lb. per sq.in. are used depending upon the liquid being treated.

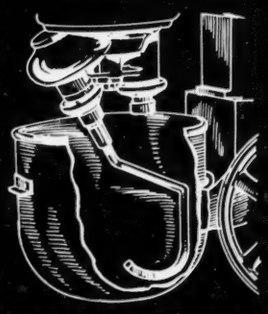
HIGH PRESSURE two-stage homogenization results when triplex plunger or piston type pumps force the liquids through two identical valves set in series in the line beyond the pump discharge valve as shown in Fig. 17 or through a single valve illustrated in Fig. 18 (b) in which a breaker ring restricts the flow of liquid after it has been forced through the first stage homogenization valve. This breaker ring serves as the second stage homogenization valve which is designed to give the desired type of restriction to the flow of the liquid under pressure. Since the breaker ring can not be adjusted, different breaker rings have to be inserted for various specific operating pressures. Secondary pressures as great as 500 lb. per sq.in. are obtainable by inserting the properly designed breaker ring. When only single stage homogeniza-



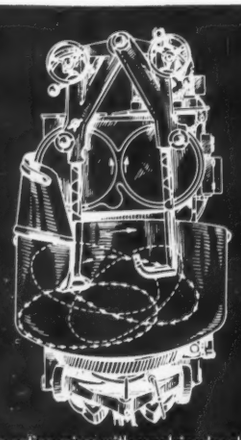


(23) Large-capacity variable-speed beater mixer. (American Machine & Foundry Co.)

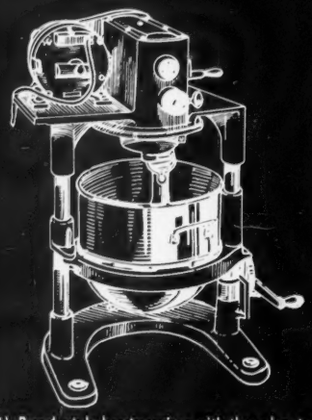
(24) Revolving-bowl beater and arm mixer having four speeds on mixing arm and four speeds on bowl. May have heating attachments. (Triumph Mfg. Co.)



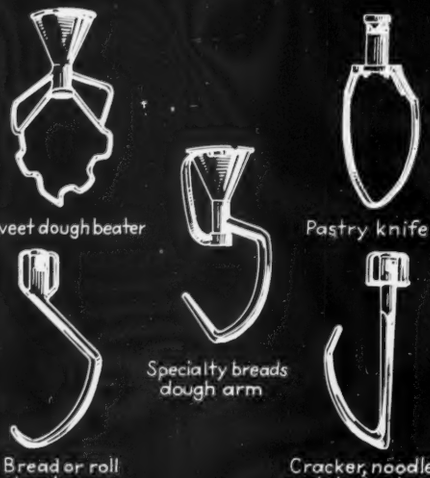
(22) Double-action beater and arm mixer with four speeds on vertical shaft for beaters and four speeds on inclined shaft for arms. (Adolphe Hurst & Co., Inc.)



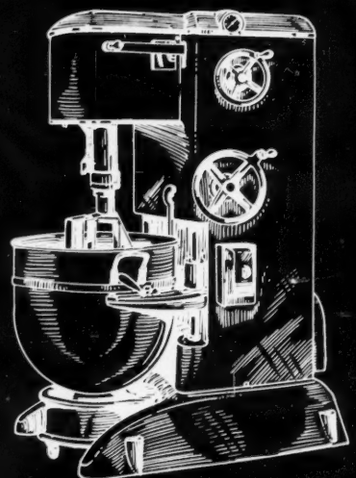
(25) Triple-action mixer with revolving bowl and mixing elements which imitate hand kneading movements. (Adolphe Hurst & Co., Inc.)



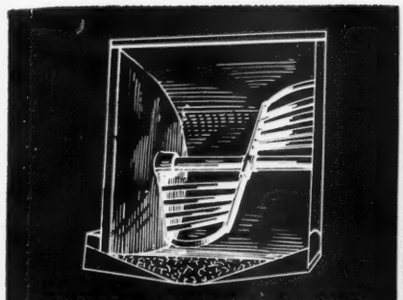
(21) Bench-style beater mixer with three beater speeds. (Read Machinery Co., Inc.)



(19) Double-action beater and arm mixer with choice of agitators for ordinary to stiff pastes or doughs. (Hobart Mfg. Co.)

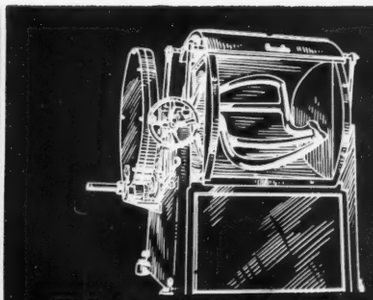


(20) Variable-speed beater mixer for batters or light pastes. (Century Machine Co.)

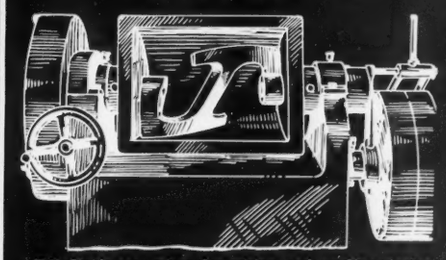


(26) Slat type arm mixer for pastes of batter consistency. (Read Machinery Co.)

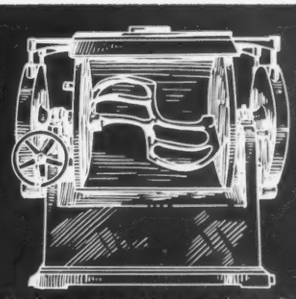
(27) Blade agitator mixer for mixing pastes by a cutting or slicing action. (Peerless Bread Machinery Co.)



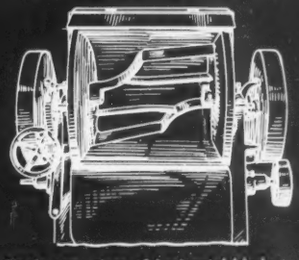
(28) Single-arm mixer with a slow beating, working or kneading in combination with a mixing action. (Read Machinery Co.)



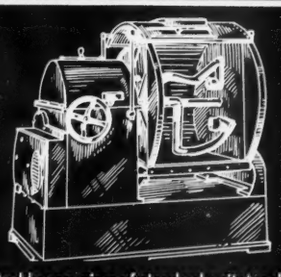
(30) Single-arm mixer for mixing and working pastes ranging from dough consistency to heavy tough plastic masses like chewing gum. (J. H. Day Co.)



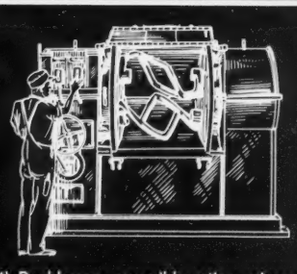
(29) Single-arm mixer giving an end to end mixing movement as well as a cutting beating or kneading action. (Champion Machinery Co.)



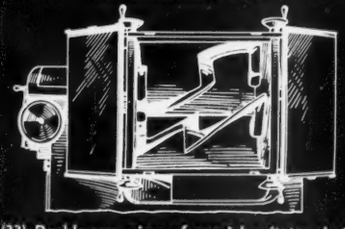
(31) Single-arm mixer of horizontal blade type of agitator which gives a cutting as well as mixing and working action. (Triumph Mfg. Co.)



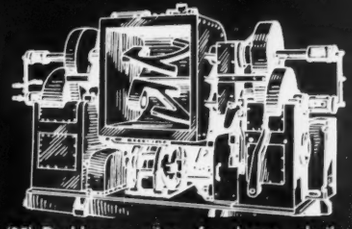
(32) Double-arm mixer of standard agitator design for pastes and doughs of medium consistency. (Read Machinery Co.)



(34) Double-arm reversible-action mixer for dough-type pastes. (Read Machinery Co.)



(33) Double-arm mixer of special agitator design for pastes having batter consistency. (Century Machine Co.)



(35) Double-arm mixer for heavy plastic masses. (J. H. Day Co.)

tion is desired a breaker ring which gives no secondary pressure is used. In that case the breaker ring serves merely as a valve guide for the upper part of the homogenizing valve.

In both of these two-stage homogenizers, pressures ranging from 1,000 to 2,500 or more lb. per sq.in. are used. Also the homogenization valves themselves are under adjustable spring control which keeps them firmly seated until the built-up pressure is sufficient to overcome the spring pressure and allow the liquid or finely ground suspension to pass through in almost film-form and with an extreme disintegrating and dispersing action.

Homogenization gives mixtures having the highest degree of dispersion and the most complete mixing of compounds which will ordinarily separate into layers of strata if not kept in constant motion. When carried out under most favorable conditions it produces emulsions and suspensions which are as near permanent in character as has yet been possible to obtain. However when considering the use of homogenization to do a dispersing or mixing job it is well to remember that homogenization cannot be used with suspensions unless the solid particles are present in dilute proportions; unless they are in a very finely ground state; and unless they are not abrasive.

More detailed and extensive discussions of the dispersion phase of mixing are found in William Clayton's "Theory of Emulsions," Arthur W. Thomas' "Colloid Chemistry," John E. Perry's "Chemical Engineer's Handbook" and Jerome Alexander's "Colloid Chemistry, Principles and Applications."

Paste or Dough Mixers

Combining liquids and solids to form pastes, plastics and doughs is a highly complex phase of mixing. To a large extent this phase of mixing has to do with component materials which, individually, are free-flowing and easily handled but which form sticky, thick, heavy, and, in some cases, tough masses during the course of mixing.

Because of changes which take place during the mixing operation, the movement or flow of the mixtures becomes quite limited. Consequently the operation is carried out on batch lots and the mechanics of the operation become one of beating, working, stretching, folding, kneading, tearing, and even crushing to get the desired distribution of the components throughout the mass.

THE CRUSHING ASPECT OF mixing is usually performed by rolls which operate parallel to each other in a horizontal plane and may be grouped in pairs, threes or fives with each roll turning at a different speed. In some instances they are individually mounted so as to travel in a circular path on a supporting surface that is stationary or moving in an opposite direction and are supplemented by plows or scrapers to keep the materials in movement and in the path of the heavy and slowly moving rolls. Equipment using rolls as mixers find more extensive use out of the food manufacturing field than in it. When used in industries such as chocolate manufacture as "chasers," melangeurs, and conges they must be regarded as very special forms of mixers with remote possibilty of use elsewhere in food manufacture.

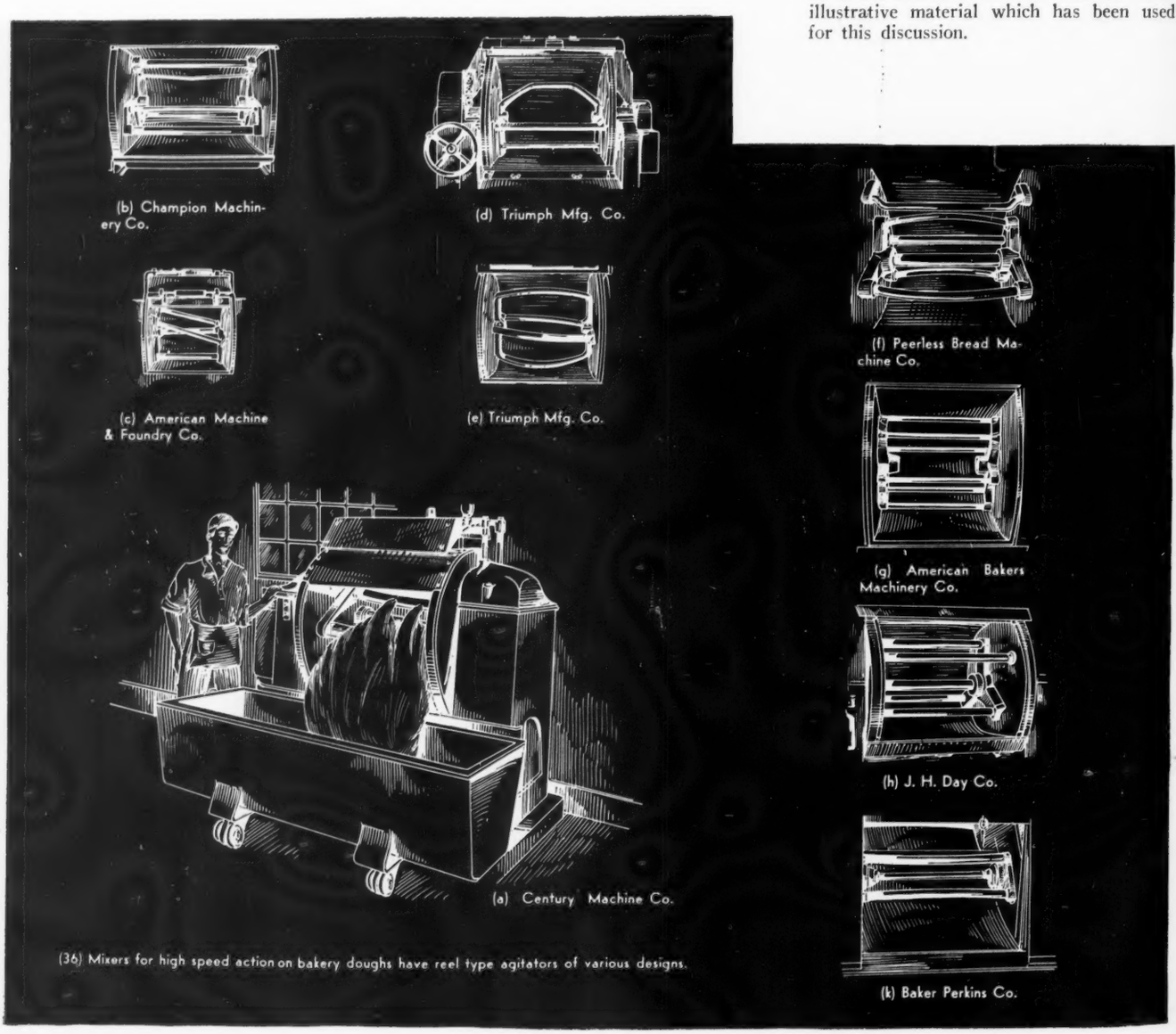
The beating, working, stretching, folding, kneading and rolling aspects of mixing are characteristic of a group of mixers known as dough mixers. These mixers may be vertical as illustrated in Figs. 19 to 25 or horizontal as shown in Figs. 26 to 36. Those of the vertical type consist essentially of a bowl-shaped vessel inside of which operate agitator devices to impart a mixing or blending movement to the ingredient components of the mixture and a beating, working, stretching, and kneading action to the mass after the mixture has reached the partially-mixed paste, plastic or dough state.

These devices may be in the form of beaters, arms, hooks, or cutters shaped to give the different portions of the paste or dough mass the type of action or movement necessary for a uniform mixture. The operating action of these devices vary from simple rotation in a vertical plane to a combination lifting, stretching, and folding action. The simple rotation in a vertical or inclined plane is very likely to be accompanied by an overlapping whirling motion of the agitator or a rotation of the bowl itself. These mixers are geared to operate at low, medium, or high speed velocities. In some instances they have variable speed control while in other instances the agitators and the bowls each rotate at four different speeds. Capacities of these mixers vary from a few quarts to 186 gal. liquid volume.

HORIZONTAL DOUGH or heavy paste mixers are of two styles. Those with bent arm agitators are for slow-speed mixing and have wide usage ranging from the mixing and beating of sponges and batters to the mixing and kneading of macaroni doughs, or chewing gum mixes. These mixers may have single-arm agitators as shown in Figs. 28 to 31 or double-arm agitators illustrated in Figs. 32 to 35. The agitators of the double-arm mixers usually operate at different speeds and in opposite directions so as to throw the mass from one part of the mixer bowl to the other with a rubbing, beating and tearing action which aids in the distribution of the ingredients throughout the mass and in forcing the adsorption of the liquids by the solid components.

High speed mixers illustrated by Fig. 36 have been developed primarily for the bread making industry. In some instances they are referred to as dough conditioners because the several types of agitators used Fig. 36 (*a* to *h* and *k*) embody engineering features which give the doughs the different degrees of rolling, folding, stretching, kneading and the like for putting the gluten of the flour in the proper hydrated and plastic condition for the production of loaf bread. Arguments in favor of each type of agitator (they are all of the reel design) are too involved to be included in an introductory discussion such as this. Illustrations of each type of reel agitator available to us are being shown for purposes of visual comparison.

As in Part I of this discussion manufacturer identification of the mixers and mixer parts used as illustrations signifies the source of our illustrative material. It should not be taken as an indication that only the one company makes that type of mixer. This method of presentation is our acknowledgment for the assistance given us in the collection of the information and illustrative material which has been used for this discussion.


(b) Champion Machinery Co.
(d) Triumph Mfg. Co.
(c) American Machine & Foundry Co.
(e) Triumph Mfg. Co.
(f) Peerless Bread Machine Co.
(g) American Bakers Machinery Co.
(a) Century Machine Co.
(h) J. H. Day Co.
(k) Baker Perkins Co.

(36) Mixers for high speed action on bakery doughs have reel type agitators of various designs.